



Fonksiyonlar

Cözüm 1

1. $f(x) = c \rightarrow$ Sabit fonksiyon
 $g(x) = x \rightarrow$ Birim fonksiyon

$$f(x) = \underbrace{(a+3+7)}_{\text{sifir}} x^3 + \underbrace{(5-a-b)}_{\text{sifir}} x^2 - \underbrace{(b+c)}_{\text{sifir}} x + c$$

$$a = -10 \quad b = 15 \quad c = -15$$

$$\underline{f(x) = c = -15}$$

$$g(x) = \underbrace{(m+3+7)}_{\text{sifir}} x^3 + \underbrace{(5-m-n)}_{\text{sifir}} x^2 - \underbrace{(n+k)}_{\text{eksi bir}} x$$

$$m = -10 \quad n = 15 \quad n = -16$$

$$g(a+b+c+m-n-k) - f(m) = ?$$

$$g(-19) - f(-10) = -19 - (-15) = -4 \text{ tür.}$$

CEVAP: A

2. $f(x) = \frac{m-1}{6} = \frac{4}{m+1}$

$$24 = m^2 - 1 \Rightarrow m^2 = 25$$

$$m = 5 \Rightarrow f(x) = \frac{2}{3} \quad m + f(m) = \frac{17}{3}$$

$$m = -5 \Rightarrow f(x) = -1 \quad m + f(m) = 6$$

CEVAP: Ç

3. $\underbrace{f(1)}_c + \underbrace{f(2)}_c + \underbrace{f(3)}_c + \dots + \underbrace{f(17)}_c = 153$

$$17c = 153 \Rightarrow c = 9 \Rightarrow f(x) = 9$$

$$(3f - 2g)\left(\frac{7}{2}\right) = 3f\left(\frac{7}{2}\right) - 2g\left(\frac{7}{2}\right) = ?$$

$$3 \cdot 9 - 2 \cdot \frac{7}{2} = 20$$

CEVAP: D

4.

$$f(x) = \frac{2ax^2 + 5ax}{5+2x} + 4x - 3a + 1$$

$$\frac{2ax^2 + 5ax}{5+2x} = -4x$$

$$2ax^2 + 5ax = -8x^2 - 20x$$

$$a = -4$$

$$f(x) = -3a + 1 = 13$$

$$a - f(a) = -4 - 13 = -17$$

CEVAP: E

5. $f(x) = c$ diyelim

$$O \text{ hâlde, } f(x^2 - 5x) = c = f(4 - x^3)$$

$$3c + 2 \cdot (a - 3) = 5 \quad (g \text{ birim fonksiyon})$$

$$2c - (3a + 1) = 2$$

$$\begin{array}{r} \cancel{3} \\ + \end{array} \begin{array}{r} 3c + 2a = 11 \\ \cancel{2} \\ + \end{array}$$

$$\begin{array}{r} 13c = 39 \Rightarrow c = 3 \Rightarrow a = 1 \\ (f+g)(a) = f(a) + g(a) = c + a = 4 \text{ tür.} \end{array}$$

CEVAP: B

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- 6.

$$\begin{array}{r} \frac{x}{3} \quad \frac{y}{-7} \\ -5 \left(\begin{array}{r} 3 \\ -2 \\ 5 \end{array} \right) 20 \\ +7 \left(\begin{array}{r} -2 \\ 13 \\ -15 \end{array} \right) -28 \end{array}$$

CEVAP: A

7. $f(x) = ax + b$ dersetek;

$$f(2x+1) = 2ax + a + b$$

$$+ \quad f(x-2) = ax - 2a + b$$

$$3ax - a + 2b = 15x + 1$$

$$a = 5 \quad b = 3$$

$$f(x) = 5x + 3$$

$$f\left(\frac{3}{5}\right) = 3 + 3 = 6$$

CEVAP: C

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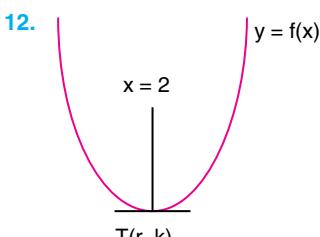
8. $\frac{x}{4} + \frac{y}{2} = 1$

$$x + 2y = 4$$

$$y = \frac{4-x}{2} \Rightarrow f(x+3) = \frac{4-x}{2}$$

$x = 0 : f(3) = 2$ olur.,

CEVAP: B



$$r = \frac{-b}{2a} = 2$$

$f(2) = -5$ bulunur.
min.

$f(-3) = 45$ (max)

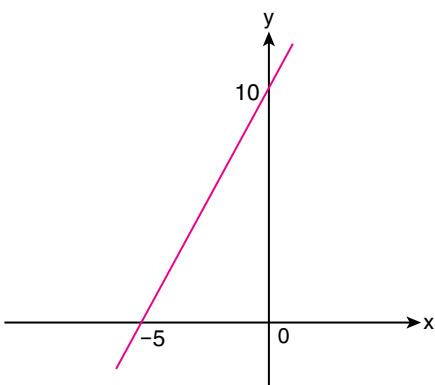
$$\frac{45 - (-5)}{1} + 1 = 51 \text{ olur.}$$

CEVAP: E

9. f , doğrusal fonksiyon ise

$$m - 5 = 0 \Rightarrow m = 5$$
 tür.

$$f(x) = 2x + 10$$



$$\text{Alan} = \frac{5 \cdot 10}{2} = 25 \text{ br}^2$$

10. $f: R \rightarrow R$

$$f(x) = \frac{9-2x}{(k+2)x-6}$$

$$f(x) = \frac{9}{-6} = \frac{-2}{k+2} \Rightarrow 4 = 3k + 6$$

$$k = -\frac{2}{3}$$

$$k+2 = 0 \Rightarrow k = -2$$

$$(-2) \cdot \left(-\frac{2}{3}\right) = \frac{4}{3}, \text{tür.}$$

CEVAP: C

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$$x = 2: \quad 2f\left(\frac{1}{2}\right) + 2 = 4 + f(2)$$

$$x = 8: \quad 2f(2) + 8 = 64 + f\left(\frac{1}{2}\right)/2$$

$$4f(2) + 18 = 132 + f(2)$$

$$3f(2) = 114 \Rightarrow f(2) = 38$$

CEVAP: C

11. I ve II birebir $\Rightarrow a = 2$

III örten $\Rightarrow b = 1$

$a + b = 3$ 'tür.

CEVAP: D

CEVAP: C

14. $f(2^x + 2^{-x}) = 4^x + 4^{-x} = (2^x + 2^{-x})^2 - 2$

$$f(6) = 6^2 - 2 = 36 - 2 = 34 \text{ tür.}$$

CEVAP: C



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Çözüm 2

1. $f(x^2 - 2x) = 4x^3 - x^4 - 4x^2 + 1$

$f(x^2 - 2x) = -(x^2 - 2x)^2 + 1$

$f(x - 1) = -(x - 1)^2 + 1 = -x^2 + 2x$

CEVAP: A

2. $f\left(\frac{3-2x}{5x+1}\right) = \frac{3+15x}{4x-6} = \left(\frac{3-2x}{5x+1}\right)^{-1} \cdot \left(\frac{3}{-2}\right)$
 $f\left(\frac{3}{2}\right) = \frac{2}{3} \cdot \left(\frac{3}{-2}\right) = -1$ dir.

CEVAP: D

3. $f(2x - 3) = 4x^2 - 12x + 5$
 $f(2x - 3) = (2x - 3)^2 - 4$
 $f(-2) = (-2)^2 - 4 = 0$

CEVAP: A

4. $f(x^2 - 4x + 1) = 3x + 2$
 $f((x-2)^2 - 3) = 3x + 2$

3 ekleyip karekökünü alarak tanım aralığı gereğince $(-x + 2)$ bulduktan sonra, -3 ile çarpıp 8 eklenir.

$f(-2) = \sqrt{-2 + 3} \cdot (-3) + 8 = 5$ tır.

CEVAP: C

5.

$$f(x+3) - f(1+x) = 3x$$

$$f(79) - f(77) = 3 \cdot 76$$

$$f(77) - f(75) = 3 \cdot 74$$

$$f(75) - f(73) = 3 \cdot 72$$

⋮

$$+ \frac{f(9) - f(7)}{f(79) - f(7)} = 3 \cdot 6$$

$$f(79) - f(7) = 6 \cdot \left[\frac{38 \cdot 39}{2} - 3 \right]$$

$$5000 - f(7) = 4428$$

$$f(7) = 572$$
 dir.

CEVAP: D

6.

$$\frac{f(x-4)}{f(x-3)} = 2x$$

$$\frac{f(4)}{f(5)} \cdot \frac{f(5)}{f(6)} \cdot \frac{f(6)}{f(7)} \cdot \dots \cdot \frac{f(28)}{f(29)} = \frac{f(4)}{f(29)}$$

$$\frac{f(4)}{f(29)} = \frac{32!}{7!} \cdot 2^{25}$$

$$f(29) = \frac{7!}{2^{25}} \text{ olur.}$$

CEVAP: E

7. $f(x+y) = f(x+1) \cdot f(y-1)$

I. $3^{x+y} = 3^{x+1} \cdot 3^{y-1}$

II. $(x+y)^2 - 1 \neq [(x+1)^2 - 1][(y-1)^2 - 1]$

III. $5^{x+y+1} \neq 5^{x+2} \cdot 5^y$

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8. $f(x \cdot y) = f(x) + f(y)$

$$x = y = 3$$

$$f(3^2) = f(3) + f(3) = 2f(3)$$

$$x = 9 \quad y = 3$$

$$f(3^3) = f(3^2) + f(3) = 3f(3)$$

$$x = y = 3^2$$

$$f(3^4) = f(3^2) + f(3^2) = 4f(3)$$

⋮

$$f(3^{21}) = 21 \cdot \underbrace{f(3)}_{\frac{1}{3}} = 7 \text{ olur.}$$

9. $f(x+4) = f(x+3)[x+5]$

$$\frac{f(x+4)}{f(x+3)} = x+5$$

$$\frac{f(0)}{f(-1)} \cdot \frac{f(1)}{f(0)} \cdot \frac{f(2)}{f(1)} \cdot \dots \cdot \frac{f(x)}{f(x-1)}$$

$$\frac{f(x)}{f(-1)} = (x+1)!$$

$$f(x) = (x+1)!$$

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10. $f\left(2x + \frac{1}{x}\right) = 2x - \frac{1}{x} + 1$

$$f\left(2x + \frac{1}{x}\right) = \sqrt{\left(2x + \frac{1}{x}\right)^2 - 8 + 1}$$

$$f(2\sqrt{6}) = \sqrt{(2\sqrt{6})^2 - 8 + 1}$$

$$f(2\sqrt{6}) = 5 \text{ olur.}$$

11. $f(2x - 3) = 5x - 2$

$$f(x) = \frac{5x + 11}{2}$$

$$f^{-1}(x) = \frac{2x - 11}{5}$$

CEVAP: A

CEVAP: D

12. $f(x) = \frac{3x - 4}{6 - x}$

$$f^{-1}(x) = \frac{-6x - 4}{-3 - x}$$

$$6 - x = 0 \Rightarrow x = 6$$

$$-3 - x = 0 \Rightarrow x = -3$$

$$a = 6$$

$$b = -3$$

$$f(a - 3) + f(b + 7) = f(3) + f(4)$$

$$\frac{5}{3} + \frac{8}{2} = \frac{17}{3}$$

CEVAP: B

CEVAP: E

13. $f\left(\frac{x-5}{4+3x}\right) = \frac{x^2+3}{x+9}$

$$f^{-1}\left(\frac{x^2+3}{x+9}\right) = \frac{x-5}{4+3x}$$

$$\frac{x^2+3}{x+9} = 1 \Rightarrow x^2 - x - 6 = 0$$

$$(x-3)(x+2) = 0$$

$$x = 3 \quad x = -2$$

$x = -2$ için:

$$f^{-1}(1) = \frac{-7}{-2} = \frac{7}{2}$$

CEVAP: D

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Fonksiyonlar

Cözüm 3

1. $f(x) = x^2 + 6x - 3$
 $f(x) = (x+3)^2 - 12$
 $y+12 = (x+3)^2$
 $\sqrt{y+12} = |x+3| = -x-3$
 $x = -3 - \sqrt{y+12}$
 $y = -3 - \sqrt{x+12}$

CEVAP: D

2. $f(x) = 5 - 8x + x^2$
 $f^{-1}(x^2 - 8x + 5) = x$
 $x^2 - 8x + 5 = 14$
 $x^2 - 8x - 9 = 0$
 $(x-9)(x+1) = 0$
 $x = 9 \quad x = -1$

CEVAP: E

3. $f(x) = x^2 + x + \frac{5}{4}$
 $f^{-1}\left(x^2 + x + \frac{5}{4}\right) = x$
 $x^2 + x + \frac{5}{4} = 10$
 $x^2 + x - \frac{35}{4} = 0$
 $4x^2 + 4x - 35 = 0$
 $\begin{array}{r} 2x \\ 2x \\ \hline 2x \end{array} \quad \begin{array}{r} +7 \\ -5 \\ \hline \end{array}$
 $(2x+7)(2x-5) = 0$
 $x = -\frac{7}{2} \quad x = \frac{5}{2}$

CEVAP: B

4. $x = \frac{5 - 2f(x)}{3f(x) + 2}$
 $f^{-1}(x) = \frac{5 - 2x}{3x + 2}$
 $f^{-1}(-1) = \frac{7}{-1} = -7$

CEVAP: A

5. $x = \frac{2x + f(x) - 1}{3f(x) + 5}$
 $3xy + 5x = 2x + y - 1$
 $3xy + 3x = y - 1$
 $x(3y + 3) = y - 1$
 $x = \frac{y - 1}{3y + 3}$
 $f^{-1}(x) = \frac{x - 1}{3x + 3}$
 $f^{-1}(0) = -\frac{1}{3}$ olur.

CEVAP: D

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6. $3x \cdot f^{-1}(2x-1) - 5f^{-1}(2x-1) = 7 + 2x$
 $f^{-1}(2x-1)[3x-5] = 7 + 2x$
 $f^{-1}(2x-1) = \frac{7+2x}{3x-5}$
 $f^{-1}(x) = \frac{x+8}{3x-7} = \frac{2x+16}{3x-7}$

CEVAP: C

Fonksiyonlar

7. $g(f(x) - 3) = 2x + 1$

$$f^{-1}(2x + 3) = 3x - 6$$

$$g^{-1}(2x + 1) = f(x) - 3 \quad x = 3 \Rightarrow$$

$$g^{-1}(7) = f(3) - 3 = ?$$

$$f(3x - 6) = 2x + 3 \quad x = 3 \Rightarrow$$

$$f(3) = 9$$

$$g^{-1}(7) = f(3) - 3 = 6 \text{ olur.}$$

CEVAP: B

8. $3x \cdot g^2(x) + 2g(x) = x$

$$3x \cdot g^2(x) - x = -2g(x)$$

$$x = \frac{-2g(x)}{3g^2(x) - 1}$$

$$g^{-1}(x) = \frac{-2x}{3x^2 - 1}$$

$$g^{-1}(\sqrt{2}) = \frac{-2\sqrt{2}}{5}$$

10. $(h \circ f \circ g)(13) = h\left[\overbrace{f(g(13))}^4\right]$

$$h\left[\overbrace{f(4)}^{13}\right] = h(13) = 47$$

CEVAP: C

11. $f(x) = \frac{x+5}{3} \quad f^{-1}(x) = 3x - 5$

$$(g \circ f \circ f^{-1})(x) = (2x^2 - x + 1) \circ f^{-1}(x)$$

$$g(x) = (2x^2 - x + 1) \cdot (3x - 5)$$

$$g(x) = 18x^2 - 60x + 50$$

$$\begin{array}{r} -3x \\ +5 \\ +1 \end{array}$$

$$g(x) = 18x^2 - 63x + 56$$

CEVAP: E

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CEVAP: A

9. $f, 1 - 1$ ve örten olmalıdır.

$$t = (r, k)$$

$$r = \frac{-b}{2a} = \frac{12}{4} = 3$$

$a = 3$ alınır.

$$f(3) = 18 - 36 + 5 = -13$$
 tür.

$a - b = 16$ bulunur.

12. $f\left(\frac{2x-5}{3+7x}\right) = 1 - 2x$

$$x \rightarrow \frac{-3x-5}{-2+7x}$$

$$1 + \frac{6x+10}{7x-2} = \frac{13x+8}{7x-2}$$

CEVAP: A

CEVAP: E



Fonksiyonlar

Çözüm 4

1. $(fog)(x^2 - x) = g^2(x^2 - x) + 3g(x^2 - x) + 1$
 $f(x) = x^2 + 3x + 1$
 $(gof)(2x + 3) = 4f(2x + 3) - 5$
 $g(x) = 4x - 5$
 $f(-1) + g(-1) = (-1) + (-9) = -10$

CEVAP: B

4. $(gof)(x) = x^2 - x + 2$
 $g(x) = f(3x)$ ise
 $g(3) = f(9)$
 $(gof)(9) = 81 - 9 + 2 = 74$
 $(gog)(3) = 74$ 'tür.

CEVAP: D

2. $(f^{-1}ogoh)(x) = x^2 - 1$
 $(fogoh)(x) = 1 + 2x$
 $(h^{-1}og^{-1}of^{-1})(x) = \frac{x-1}{2}$
 $(f^{-1}ogohoh^{-1}og^{-1}of^{-1})(x) = (x^2 - 1)o\left(\frac{x-1}{2}\right)$
 $(f^{-1}of^{-1})(x) = (x^2 - 1)o\left(\frac{x-1}{2}\right)$
 $(f^{-1}of^{-1})(-5) = 8$

CEVAP: D

5. $f(x) = \frac{bx-1}{x-a}$ $f^{-1}(x) = \frac{ax-1}{x-b}$
 $x - a = 0$ $x - b = 0$
 $x = a \Rightarrow a = 3$ $x = b \Rightarrow b = 3$
 $f(x) = f^{-1}(x)$ oldu.
 $\underbrace{(fofоfo...of)}_{1903 \text{ tane}}(-2) = f(-2)$
 $f(-2) = \frac{-7}{-5} = \frac{7}{5}$

CEVAP: C

3. $(g^{-1}ofoh)(x) = 5x + 2$
 $(hof^{-1}og)(x) = \frac{x-2}{5} + x - 2$
 $(hof^{-1}ogog^{-1}ofoh)(x) = (hoh)(x)$
 $(hoh)(x) = \left(\frac{x-2}{5} + x - 2\right)o(5x + 2)$
 $(hoh)(x) = 6x$
 $(hoh)\left(\frac{5}{6}\right) = 5$ olur.

CEVAP: C

6. $f^{-1}(2x + 3) = (fof)(5x - 1)$
 $(fofоf)(5x - 1) = 2x + 3$
 $x = 4$ için
 $(fofоf)(19) = 11$

CEVAP: B

7. $g(x) = x + 3$

$$g(2) = 5 \quad |+3$$

$$(gog)(2) = 8 \quad |+3$$

$$(gogog)(2) = 11 \quad |+3$$

$$\underbrace{(gogo\dots og)(2)}_{29 \text{ tane}} = 5 + 28 \cdot 3 = 89$$

8. $(fog)(x) = 3x - 1$

$$(hog)(x) = 5 + x$$

$$(g^{-1}oh^{-1})(x) = x - 5$$

$$(fogog^{-1}oh^{-1})(x) = (3x - 1) \circ (x - 5)$$

$$(foh^{-1})(x) = 3x - 16$$

$$(foh^{-1})(-2) = -22$$

9. $[(fog^{-1})]^{-1}(8x + 3) = g(4 - 3x)$

$$(gof^{-1})(8x + 3) = g(4 - 3x)$$

$$f^{-1}(8x + 3) = 4 - 3x$$

$$f(4 - 3x) = 8x + 3$$

$$x = 3 \text{ için}$$

$$f(-5) = 27$$

10. $K = [-5, 4) \cup (5, 8] - \{-3\}$

$$N = [-3, 6]$$

$$K \setminus N = [-5, -3) \cup (6, 8]$$

CEVAP: E

CEVAP: C

11. $f(x - 2) = 0$

$$x = (-5 + 3), (2 + 3), (4 + 3), (8 + 3)$$

$$x = \underbrace{-2, 5, 7, 11}_{\text{toplam } 21 \text{ dir.}}$$

CEVAP: C

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Fonksiyonlar

Cözüm 5

1. $\frac{f(5) + f^{-1}(4)}{f^{-1}(0) + f(3) \cdot f^{-1}(-2)} = \frac{0+1}{5+3 \cdot 6} = \frac{1}{23}$

CEVAP: E

2. $\frac{g(0) + g^{-1}(1)}{g(1) - g^{-1}(-4)} + g^{-1}(0) = \frac{0+1}{1-(-3)} + 0 = \frac{1}{4}$

CEVAP: E

3. $\frac{f(3) + f^{-1}(3)}{f(-4) - f^{-1}(-1)} = \frac{(-1) + (-3)}{4-3} = -4$

CEVAP: B

4. $(f \circ g)(1) = f\left(\underbrace{g(1)}_2\right) = ?$

$f(2) = ? \quad f(2) = g(3)$

$$g(x+1) = \frac{6+2x}{3}$$

$$g(3) = \frac{10}{3} \text{ olur.}$$

CEVAP: A

5. $f(2) + g(-3) = ?$

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$$g^{-1}(2) + f^{-1}(-3) = ?$$

$$3 + (-2) = 1 \text{ olur.}$$

CEVAP: C

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6.

$$g(-3) = \frac{\left(\frac{3}{2}+6\right) \cdot 3}{2} = \frac{45}{4}$$

$$g(-1) = \frac{\left(\frac{9}{2}+6\right) \cdot 1}{2} = \frac{21}{4}$$

$$\frac{45}{4} - \frac{21}{4} = \frac{24}{4} = 6$$

CEVAP: C

Fonksiyonlar

7. Çift fonksiyon

$$2f(x) + 3x^2 - x = f(x) + (k+3)x - (k+2)x^2 + k$$

$$k+3 = -1 \Rightarrow k = -4 \text{ tür.}$$

$$f(x) = -x^2 - 4$$

$$f(-2) = -8$$

CEVAP: A

8. g tek fonksiyon

$$-3g(x) + (m+2)x^2 - mx^3 = g(x) + 4x^2 + 2x^3 - 12x$$

$$m = 2$$

$$-4x^3 + 12x = 4g(x)$$

$$g(x) = -x^3 + 3x$$

$$g(m) = g(2) = -2$$

CEVAP: B

$$\left. \begin{aligned} \frac{f(9) - f(4)}{9 - 4} &= \frac{5 - 17}{5} = -\frac{12}{5} \\ \frac{f(7) - f(-2)}{7 - (-2)} &= \frac{-4 - 12}{9} = -\frac{16}{9} \end{aligned} \right\} \begin{array}{l} \frac{64}{15} \\ \frac{16}{9} \end{array}$$

CEVAP: A

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Fonksiyonlar

Çözüm 6

1. Doğrusal fonksiyonların ortalama değişim oranı daima eğime eşittir.

$$m = \frac{4 - (-2)}{-5 - 7} = \frac{6}{-12} = -\frac{1}{2}$$

CEVAP: D

4. Grafik $x^2 - 16$ parabolünün $x < -2$ için parçasını içe-ri. Ayrıca doğru denklemi:

$$\cancel{6/\frac{x}{6} + \frac{y}{2} = 1}$$

$$x + 3y = 6$$

$$y = \frac{6-x}{3}, \text{tür.}$$

Bu doğruda $x \geq -2$ için çizilmiştir.

CEVAP: A

2. Verilen fonksiyon grafiği $(5, 6)$ aralığında negatif de-ğerli değildir. Ayrıca artandır.

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CEVAP: D

3. Verilen fonksiyon grafiği $(-5, 3)$ aralığında negatif de-ğerlidir. Ancak $(-5, -2)$ de azalan $(-2, 3)$ de artandır.

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CEVAP: C

5. $\frac{f(x) + |f(x)|}{2} = g(x)$ olsun.

$$g(x) = \begin{cases} f(x), & f(x) \geq 0 \\ 0, & f(x) < 0 \end{cases}$$

Buna uygun olarak verilen grafik A seçeneğidir.

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6. $f(-2) = 4$ veya $f(-2) = 10$

$f(4) = 10$

$$\begin{array}{r} \frac{x}{-2} \\ +6 \quad \frac{y}{4} \\ \hline \frac{-2}{8} \end{array}$$

$f(-2) = 10$

$f(4) = 4$

$$\begin{array}{r} \frac{x}{-2} \\ +6 \quad \frac{y}{10} \\ \hline \frac{-2}{6} \end{array}$$

$6 \cdot 8 = 48$

CEVAP: D

8. $x = -2$ için;

$$f(5) + 4 - \underbrace{g(-3)}_{g(3)} = \underbrace{f(-5)}_{-f(5)} + 3g(3) + 2 + 6$$

$$2f(5) = 4\underbrace{g(3)}_{-11} + 4 = -40$$

$$f(5) = -20$$

CEVAP: D

7. $-f(-x) = f(x)$: f tek fonksiyondur.

$k - 3 = -4$ olmalıdır.

$k = -1$ bulunur.

$g(k) = g(-1) = 3$ olur.

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CEVAP: A



Fonksiyonlar

Cözüm 7

1. $f(2x) = 3^{2x+2}$

$$(x-2) = 3^x$$

$$f(2x) = (3^x)^2 \cdot 3^2$$

$$f(2x) = [f(x-2)]^2 \cdot 9$$

CEVAP: C

2. $f(x) = |||x-9|-3| = m$

4 kök olmalı

$$m > 0$$

$$|x-9|-3 = m$$

$$|x-9|-3 = -m$$

$$|x-9| = m+3$$

$$|x-9| = 3-m$$

$$m+3 > 0$$

$$3-m > 0$$

$$m > -3$$

$$m < 3$$

$$-3 < m < 3 \text{ olur.}$$

$$\rightarrow 0 < m < 3'tür.$$

$$1 + 2 = 3$$

CEVAP: D

3. $3-x < 7$

$$x+2 < 7$$

$$3-7 < x$$

$$x < 5$$

$$-4 < x$$

$$(x \leq 2 \text{ için})$$

$$(x > 2 \text{ için})$$

$$-4 < x \leq 2$$

$$2 < x < 5$$

$$-3, -2, -1, 0, 1, 2$$

$$3, 4$$

8 değer

CEVAP: C

4. $f(x^2-x+1) = 2x^{108} + x^{67} - x + 2$

$$f\left(\frac{x^3+1}{x-1}\right) = 2x^{108} + x^{67} - x + 2$$

$$f(0) \text{ için; } x^3+1 = 0$$

$$x^3 = -1 \text{ olabilir.}$$

$$f(x^2-x+1) = 2(x^3)^{36} + (x^3)^{22} \cdot x - x + 2$$

$$= 2+x-x+2$$

$$= 4 \text{ olabilir.}$$

CEVAP: D

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5.

$$g(x) = \frac{18}{x^2 + 7x + 12} = \frac{18}{(x+3)(x+4)}$$

$$g(x) = \frac{A}{x+3} + \frac{B}{x+4}$$

$$A = 18 \quad B = -18$$

$$g(x) = \frac{18}{x+3} - \frac{18}{x+4}$$

$$g(5) = \frac{18}{8} - \frac{18}{9}$$

$$g(6) = \frac{18}{9} - \frac{18}{10}$$

$$g(7) = \frac{18}{10} - \frac{18}{11}$$

⋮

$$+ g(44) = \frac{18}{47} - \frac{18}{48}$$

$$\frac{18}{8} - \frac{18}{48} \text{ olur.}$$

(6)

$$\frac{5 \cdot 18^3}{48} = \frac{15}{8} \text{ bulunur.}$$

CEVAP: E

6. $f(x) = \begin{cases} 2x + 1, & x \leq 30 \\ f(x - 4), & x > 30 \end{cases}$

$$f(1) = 3 \quad f(2) = 5 \quad f(3) = 7$$

$$\dots f(29) = 59 \quad f(30) = 61$$

$f(31) + f(27)$ } Zaten bu görüntüler
 $f(32) = f(28)$ } üst parçada bulunur.

$$3 + 5 + 7 + \dots + 59 + 61 = ?$$

$$\left[\frac{61 - 3}{2} + 1 \right] \cdot \left[\frac{61 + 3}{2} \right] = 30 \cdot 32 = 960$$

CEVAP: C

7. $f(x) - 3$ grafiği $f(x)$ grafiğinin 3 birim aşağı ötelenmiş hâlidir.

CEVAP: A

8. $f(x + 1) + 4$ grafiği $f(x)$ fonksiyonunun grafiğinin 1 birim sol ve 4 birim yukarı ötelenmiş hâlidir.

CEVAP: D

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Bölme

Çözüm 1

1.

$$\begin{array}{r} 35353 \\ - \quad 35 \\ \hline 1010 \\ - \quad 035 \\ \hline 35 \\ - \quad 03 \\ \hline \end{array} \quad a = 1010 \quad b = 3$$

$$a + b = 1013$$

CEVAP: A

2.

$$\begin{array}{r} x \mid y \\ - \quad 8 \\ \hline 11 \end{array} \quad y > 11$$

$$x = 8x + 11$$

$$y = 12 \text{ için } x = 8 \cdot 12 + 11 = 107$$

CEVAP: C

3.

$$\begin{array}{r} a \mid 41 \\ - \quad b^2 \\ \hline 3b - 1 \end{array}$$

$$41 > b^2$$

$$a = 41 \cdot (3b-1) + b^2$$

$$b = 6 \text{ için } a = 41 \cdot 17 + 36 = 733$$

CEVAP: A

4.

$$\begin{array}{r} ABC3 \mid 14 \\ - \quad xy \\ \hline \end{array}$$

$$\frac{ABC3}{\text{tek}} = \frac{14k}{\text{çift}} + \frac{xy}{\text{tek}}$$

$$14 > xy = \{13, 12, 11, 10\}$$

$$2 \text{ tane } xy \text{ var.}$$

CEVAP: D

5.

$$\begin{array}{r} 67 \cdots \mid 2x \\ - \quad 3 \cdots \\ \hline \end{array}$$

67 de (2x) sayısı 3 defa olmalı

$$x = \{0, 1, 2\} \text{ 3 tane sağlar.}$$

CEVAP: D

6.

$$\begin{array}{r} A \mid B \\ - \quad C \\ \hline k \end{array}$$

$$A = 16B + 8$$

$$A + B = 263$$

$$16B + 8 + B = 263$$

$$17B = 255$$

$$B = 15$$

CEVAP: C

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7.

$$\begin{array}{r} x \mid 5 \\ - \quad y \\ \hline 3 \end{array} \quad \begin{array}{r} y \mid z \\ - \quad 5 \\ \hline 4 \end{array}$$

$$x = 5y + 3 \quad y = 5z + 4$$

$$x = 5 \cdot (5z + 4) + 3 = 25z + 23$$

CEVAP: A

8. 11 basamaklı bir sayı 6 basamaklı bir sayıya bölündüğünde kalan en fazla 6 basamaklıdır.
 Bölen kalandan büyük olacağına göre, bölen=324574
 kalan=324573 olabilir.

CEVAP: B

Bölme

9.

$$\begin{array}{r} AB \\ - \\ \hline 7 \end{array}$$

$$AB = 2(BA) + 7$$

$$10A + B = 2(10B + A) + 7$$

$$10A + B = 20B + 2A + 7$$

$$8A = 19B + 7$$

$$B = 3 \quad 8A = 57 + 7$$

$$8A = 64$$

$$A = 8$$

$$A \cdot B = 3 \cdot 8 = 24$$

CEVAP: D

10. $A + B = 320$

$$\begin{array}{r} A \\ - \\ \hline 8 \end{array}$$

$$A = 12B + 8$$

$$12B + 8 + B = 320$$

$$13B = 312$$

$$B = 24$$

11. $\begin{array}{r} a \\ - \\ \hline 9 \end{array}$ $a = 14x + 9$, a sayısının 7 ile bölümünden kalan 2,

$b = 14y + 11$, b sayısının 7 ile bölümünden kalan 4'tür.

$\begin{array}{r} b \\ - \\ \hline 11 \end{array}$ $a \cdot b = 2 \cdot 4 = 8$, a sayısının 7 ile bölümünden kalan 1'dir.

12. $x3y5 = \underbrace{x1y7}_{13 \text{ ile}} + \underbrace{198}_{13 \text{ ile}}$
 bölümünden kalan 9 bölümünden kalan 3
 $= 9 + 3 = 12$ kalan

CEVAP: A

13. x sayısının 17 ile bölümünden kalan 15 ise x yerine (-2) kullanılabilir.

$$x^3 - 2x^2 + 17x + 11 = (-2)^3 - 2 \cdot (-2)^2 + 17 \cdot (-2) + 11$$

$= -8 - 8 - 34 + 11 = -39$ sayısının 17 ile bölümünden kalan 12'dir.

CEVAP: C

14. $\frac{xy}{7} + \frac{xy}{3}$ tam sayı ise xy sayısı 7 ve 3'e tam bölünür.

Yani 21'in katı olmalıdır.

$$xy = 21, 42, 63, 84 \quad 4 \text{ tane dir.}$$

CEVAP: C

CEVAP: B

15. $\begin{array}{r} a \\ - \\ \hline 7 \end{array}$ $a = 4b + 7$

$\begin{array}{r} b \\ - \\ \hline 8 \end{array}$ $b = 5c + 8$

$$a = 4(5c + 8) + 7$$

$$a = 20c + 39$$

$$c = 9 \text{ için } a = 20 \cdot 9 + 39 = 219$$

CEVAP: D

CEVAP: E

16. $\begin{array}{r} ABC \\ \cdots \\ - \\ \hline 34 \end{array}$ $\begin{array}{r} xy \\ \times 4 \\ \hline 68 \end{array}$

$$ABC = 17 \cdot 34 + 15 = 593$$

$$A + B + C = 5 + 9 + 3 = 17$$

CEVAP: B



Bölünebilme

Çözüm 1

1. 9 ile bölünebilme kuralı rakamları toplamı 9'un katı olmalıdır.

$$\begin{array}{cccc} (438 + 374)^3 \cdot 643 = (11)^3 \cdot 4 \\ 6 & 5 & 4 & 2 \\ & & & \\ & & & = 8 \cdot 4 = 32 = 5 \end{array}$$

CEVAP: C

2. $73b2$ rakamları toplamı

$$7 + 3 + b + 2 = 12 + b = 3k$$

$$b = 0, 3, 6, 9 \quad \text{Toplam} = 18$$

CEVAP: E

3. $24xy \rightarrow 5$ ile bölünebilme son rakam 0 ve 5 olmalıdır

$\rightarrow 4$ ile bölünebilme son iki basamağın 4 katı olmalıdır

$24x0$ ve $24x5 \rightarrow 5$ 'in katı

$24x0 \rightarrow 4$ 'ün katı $x = 0, 2, 4, 6, 8$

5 farklı x var.

CEVAP: B

4. 45 ile bölünebilme 5 ve 9 ile tam bölünebilmelidir.

$7a0$ ve $7a5 \rightarrow 5$ 'in katı

720 ve $765 \rightarrow 9$ 'un katı

a değerleri toplamı $2 + 6 = 8$

CEVAP: D

5. 12 ile tam bölünebilmesi için 3 ve 4 ile tam bölünmelidir.

$$4 \times 32 \quad \text{ve} \quad 4 \times 36 \rightarrow 4'ün katı$$

$$0, 3, 6, 9 \quad \text{ve} \quad 2, 5, 8 \Rightarrow 3'ün katı$$

$$x'ler toplamı = 0 + 6 + 9 + 2 + 5 + 8 = 30$$

CEVAP: A

6. $777\dots7 \rightarrow 5$ ile bölündüğünde kalan $2 \Rightarrow x = 2$

$$3 \text{ ile bölündüğünde } 7 \times 15 = 105$$

$$1 + 0 + 5 = 6 \quad \text{kalan } 0 \Rightarrow y = 0$$

$$x \cdot y = 0 \cdot 2 = 0$$

CEVAP: A

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7. 4 ile tam bölünmesi için
 $7 \times 16 \quad 7 \times 36 \quad 7 \times 56 \quad 7 \times 76 \quad 7 \times 96$
 $\downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow$
4 2 0,9 7 5

9 ile tam bölünmesi için

$$x = 2 + 4 + 0 + 9 + 7 + 5 = 27$$

CEVAP: A

8. $24x7y \rightarrow 5$ ile bölümünden kalan 2 ise

$$\begin{array}{r} 24 \times 77 \\ + - + - + \\ \hline 2 \end{array} \quad \text{ve} \quad \begin{array}{r} 24 \times 72 \\ + - + - + \\ \hline 7 \end{array}$$

$$x'ler toplamı = 2 + 7 = 9$$

CEVAP: D

Bölünebilme

9. 15 ile tam bölünebilmesi için 3 ve 5 tam bölünür.

15 ile bölümünden kalan 13 ise

3×53 ve $3 \times 58 \rightarrow 5$ ile bölümünden kalan 3
rakamları $0, 3, 6, 9 \rightarrow 3$ ile bölümünden kalan 1
aynı

$$x \text{ değerleri toplam} = 0 + 6 + 9 = 15$$

CEVAP: C

10. 36 ile bölümünden kalan 23

4 ile bölümünden kalan 3'dür.

$$\begin{array}{ccc} 43a51 & 43a55 & 43a59 \\ \downarrow & \downarrow & \downarrow \\ 1 & 6 & 2 \end{array}$$

9 ile bölümünden kalan 5'dir.

3 farklı değeri vardır.

CEVAP: B

11. $x6y + 3 = 12k$

4 ile bölümünden kalan 1

$$\begin{array}{ccc} x61 & x65 & x69 \\ \downarrow & \downarrow & \downarrow \\ 2, 5, 8 & 1, 4, 7 & 0, 3, 6, 9 \end{array}$$

3 ile tam bölünebilmediğidir.

$$x + y = 2 + 1 = 3 \text{ en küçük değer}$$

CEVAP: A

12. $6! + 7! + 8! = 6! + 7 \cdot 6! + 8 \cdot 7 \cdot 6!$

$$= 6! (1 + 7 + 56) = 6! \cdot 64$$

56 ile bölünemez çünkü 7 çarpanı yoktur.

CEVAP: C

13. $(2x3) \cdot (7y1)$



1, 4, 7 1, 4, 7 3'üncü katı

sayılardan biri 3'ün katı olması yeterli.

Bu yüzden $x=7$, $y=9$ alınırsa toplam en fazla 16 olur.

CEVAP: C

14. $\frac{253253...25}{26 \text{ basamaklı}}$

rakamları toplamı $(2 + 5 + 3) \cdot 8 + 2 + 5 = 87$ sayısının 9 ile bölümünden kalan 6'dır.

CEVAP: C

CEVAP: B

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15. $27xy$ sayısı için

$27x1$ ve $27x6$ 5 ile bölümünden kalan 1'dir.

12 ile bölünebilmesi için 4 ve 3 ile tam bölünebilmediğidir.

27×1 sayısı 4 ile tam bölünmez.

$2716 \quad 2736 \quad 2756 \quad 2776 \quad 2796$ 3'e tam bölünür.

$$x = \{3, 9\} \text{ 2 değer alır.}$$

CEVAP: B

16. Üç basamaklı $B = abc$ sayısı yüzler basamağındaki rakam 4'dür.

$$4bc$$

45 ile bölümünden kalan 34'dür.

5 ile bölümünden kalan 4'dür.

$4b4$ rakamları aynı $4b9$

9 ile bölümünden kalan 7'dir.

$$439 \text{ ve } b = 3 \text{ tür.}$$

CEVAP: E



Asal Çarpanlara Ayırma

Çözüm 1

1. $210 \begin{array}{c|c} & 2 \\ 105 & 3 \\ & 5 \\ 35 & 5 \\ & 7 \\ 1 & \end{array}$

$$210 = 2 \cdot 3 \cdot 5 \cdot 7$$

4 tane asal böleni var.

2. $150 \begin{array}{c|c} & 2 \\ 75 & 3 \\ 25 & 5 \\ 5 & 5 \\ 1 & \end{array}$

$$150 = 2 \cdot 3 \cdot 5^2$$

Tam sayı bölen
sayısı $= 2 \cdot (1+1)(1+1)(2+1)$
 $= 2 \cdot 2 \cdot 2 \cdot 3 = 24$

3. $120 \begin{array}{c|c} & 2 \\ 60 & 2 \\ 30 & 2 \\ 15 & 3 \\ 5 & 5 \\ 1 & \end{array}$

$$120 = 2^3 \cdot 3^1 \cdot 5^1$$

Pozitif bölen sayısı – asal bölen sayısı
 $= (3+1)(1+1)(1+1) - 3$
 $= 4 \cdot 2 \cdot 2 - 3 = 13$

4. $180 \begin{array}{c|c} & 2 \\ 90 & 2 \\ 45 & 3 \\ 15 & 3 \\ 5 & 5 \\ 1 & \end{array}$

$$180 = 2^2 \cdot 3^2 \cdot 5^1$$

$$2 \cdot [2^1 \cdot 3^2 \cdot 5^1]$$

pozitif çift bölen
sayısı $= 2 \cdot 3 \cdot 2 = 12$

CEVAP: C

5. Aralarında asal sayılar 1'den başka ortak böleni olmayan sayılardır.

26 ile 1, 3, 5, 7, 9, 11, 15, 17, 19, 21, 23, 25 ile arasında asaldır.

CEVAP: B

CEVAP: D

6. $A = 7^3 + 14^3 + 21^3 = 7^3 + 2^3 \cdot 7^3 + 3^3 \cdot 7^3$
 $= 7^3 (1 + 2^3 + 3^3) = 7^3 \cdot 36 = 7^3 \cdot 3^2 \cdot 2^2$
 $7^3 \cdot 3^2 \rightarrow 4 \cdot 3 = 12$ pozitif tek tam sayı bölen sayısı

CEVAP: C

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CEVAP: A

7. $60^a = 5^a \cdot 2^{2a} \cdot 3^a$
asal ve çift olan tek sayı 2'dir.
Asal olmayan pozitif çift tam sayı bölenleri sayısı 95
ise çift bölen sayısı 96'dır.
 $(a+1) \cdot 2a \cdot (a+1) = 96$
 $(a+1)^2 \cdot a = 48 \Rightarrow a = 3$

CEVAP: B

CEVAP: C

8. $\frac{300}{x} = \frac{2^2 \cdot 5^2 \cdot 3}{x}$ asal olması için 3 değer vardır.

CEVAP: A

Asal Çarpanlara Ayırma

9. $15 \cdot 10^n = 3 \cdot 5 \cdot 2^n \cdot 5^n = 3 \cdot 2^n \cdot 5^{n+1}$

Tam sayı bölen sayısı

$$2 \cdot 2 \cdot (n+1) \cdot (n+2) = 224$$

$$(n+1) \cdot (n+2) = 56 \Rightarrow n = 6$$

CEVAP: E

10. Asal bölenleri toplamı 10 olan $\{3, 7\}$ ve $\{2, 3, 5\}$ olabilir.

$$3 \cdot 7 = 21$$

$$3^2 \cdot 7 = 63$$

$$2 \cdot 3 \cdot 5 = 30$$

$$2^2 \cdot 3 \cdot 5 = 60$$

$$2 \cdot 3^2 \cdot 5 = 90$$

$\begin{pmatrix} 5 \text{ tane} \\ \text{sayı} \\ \text{var.} \end{pmatrix}$

CEVAP: B

11. 3 tane pozitif böleni olması için x^2 (x asal) şeklinde olmalı.

$$5^2 = 25 \text{ ve } 7^2 = 49$$

2 tanedir.

CEVAP: B

12. $24! = 1 \cdot 2 \cdot 3 \dots 24$

Asal bölenleri $= \{2, 3, 5, 7, 11, 13, 17, 19, 23\}$ 9 tanedir.

CEVAP: D

13. $126 \cdot a = b^2$

$$7 \cdot 3^2 \cdot 2 \cdot a = b^2$$

$$a = 2 \cdot 7 = 14$$

$$7^2 \cdot 3^2 \cdot 2^2 = b^2$$

$$b = 7 \cdot 3 \cdot 2 = 42$$

$$a + b = 14 + 42 = 56$$

CEVAP: A

14. $225 \cdot a = b^3$

$$5^2 \cdot 3^2 \cdot a = b^3$$

$$a = 3 \cdot 5 \cdot 2^3 = 120$$

$$5^3 \cdot 3^3 \cdot 2^3 = b^3$$

$$b = 5 \cdot 3 \cdot 2 = 30$$

$$a + b = 120 + 30 = 150$$

CEVAP: E

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15. $360 = 2^3 \cdot 3^2 \cdot 5^1$

6'nn katı 5 ile aralarında asal

$$2 \cdot 3 \cdot [2^2 \cdot 3^1 \cdot 5]$$

↓
3 · 2 = 6 tane

CEVAP: E

16. $588 = 7^2 \cdot 3^1 \cdot 2^2$

asal olmayan tam sayı bölenleri toplamı = -(asal olan bölenler toplamı) = $-(7 + 3 + 2) = -12$

CEVAP: B



Ebob - Ekok Öklit Algoritması

Cözüm 1

1. $56 = 2^3 \cdot 7^1$ $72 = 2^3 \cdot 3^2$
 $\text{Ebob}(56, 72) = 2^3 = 8$

CEVAP: C

2. $A = x^2 \cdot y^3$ $B = x^3 \cdot y$
 $\text{Ekok}(A, B) = x^3 \cdot y^3$

CEVAP: B

3. $\text{Ebob}(x, y) = 15$
 $x = 15 \cdot m$ $m = 1$ için $x = 15$
 $y = 15 \cdot n$ $n = 2$ için $y = 30$
 $x + y = 15 + 30 = 45$

CEVAP: C

4. $\text{Ekok}(a, b) = 40$
 $a = 40$ ve $b = 40$ için
 $a + b = 40 + 40 = 80$

CEVAP: B

5. 6, 8 ve 15 ile kalansız bölünen en küçük sayı için bunların ekoku bulunur.
 $6 = 2 \cdot 3$, $8 = 2^3$, $15 = 3 \cdot 5$
 $\text{Ekok}(6, 8, 15) = 2^3 \cdot 3 \cdot 5 = 120$
En büyük üç basamaklı sayı
 $120 \cdot 8 = 960$ rakamları toplamı $9 + 6 + 0 = 15$

CEVAP: A

6. $A = 7x + 4 = 8y + 4 = 10z + 4$
 $A - 4 = \text{Ekok}(7, 8, 10)$
 $A - 4 = 280 \Rightarrow A = 284$

CEVAP: B

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7. $A = 5a + 2 = 7b + 4 = 14c + 11$
 $\text{Ekok}(5, 7, 14) = 70$
Üç basamaklı ise $70 \cdot 2 = 140$
 $A + 3 = 140 \Rightarrow A = 137$

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CEVAP: E

8. $\frac{x}{y} = \frac{4}{7}$ $x = 4k$ $\text{EBOB}(x, y) = 5$
 $y = 7k$ $k = 5$
 $x = 4 \cdot 5 = 20$
 $y = 7 \cdot 5 = 35$
 $x + y = 20 + 35 = 55$

CEVAP: D

Ebob - Ekok Öklit Algoritması

9. $\text{Ebob}(A, 24) = 6$ ve $A < 130$

$A = 6k$ ve $24 = 6 \cdot 4 \rightarrow k$ ve 4 aralarında asaldır.
 $k = 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21$
 11 terim var.

CEVAP: C

10. $\text{EBOB}(A,B) = 1$ $A \cdot B = 72$

$A = 8$ ve $B = 9$ için $A + B = 17$ 'dir.

CEVAP: D

11. 12 ve 15 ile tam bölünen sayılar $\text{Ekok}(12, 15) = 60$ 'dır.
 43 ile 403 arasındaki sayılar 60, 120, 180, 240, 300,
 360 sayılarıdır. 6 tanedir.

CEVAP: B

12. a ve b ardışık sayılar ise $\text{Ebob}(a,b)=1$ $\text{Ekok}(a,-b)=a \cdot b$

$$\text{Ekok}(a,b) + \text{Ebob}(a,b) = 91$$

$$a \cdot b + 1 = 91 \Rightarrow a \cdot b = 90$$

$$a = 9, b = 10 \text{ için } a + b = 19$$

CEVAP: C

13. $A = 16 \cdot m = 2^4 \cdot m$

$$B = 18 \cdot m = 2 \cdot 3^2 \cdot m$$

$$\text{EBOB}(A,B) = 12 \quad 2m = 12$$

$$\text{EBOB}(A,B) = 2 \cdot m \quad m = 6$$

$$A = 16 \cdot 6 = 96$$

$$B = 18 \cdot 6 = 108$$

$$B - A = 108 - 96 = 12$$

CEVAP: D

14. 12, 15 ve 18'e tam bölünen sayı bu sayıların Ekok'u-dur.

$$\text{Ekok}(12, 15, 18) = 180$$

324'e yakın $180 \cdot 2 = 360$ 'tır.

$360 - 324 = 36$ eklenmeli

CEVAP: E

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15. $\text{Ebob}(a,b) \cdot \text{Ekok}(a,b) = a \cdot b$

$$\text{Ebob}(x,20) = 5 \quad x \cdot 20^1 = 5 \cdot 120^6$$

$$\text{Ekok}(x,20) = 120 \quad x = 30$$

CEVAP: C

16. $\text{Ebob}(x,y) = 12 \quad \text{Ekok}(x,y) = 360$

$x = 12m$ ve $y = 12n$ m ve n aralarında asaldır.

$$12m \cdot 12n = 12 \cdot 120^{30}$$

$$m \cdot n = 30$$

$$1 \cdot 30$$

$$2 \cdot 15$$

$$3 \cdot 10$$

$$5 \cdot 6$$

4 farklı değer vardır.

CEVAP: B



Ebob - Ekok Öklit Algoritması

Çözüm 2

1. $EBOB(18, 20) = 18x + 20y$

$$20 = 18 \cdot 1 + 2$$

$$18 = 2 \cdot 9 + 0$$

$$2 = 20 \cdot 1 - 18 \cdot 1$$

$$x = -1 \quad y = 1 \text{ olabilir.}$$

$$x \cdot y = -1$$

2. $35 = 25 \cdot 1 + 10$

$$25 = 10 \cdot 2 + 5$$

$$5 = 25 - 10 \cdot 2$$

$$5 = 25 - (35 - 25) \cdot 2$$

$$5 = -2 \cdot 35 + 3 \cdot 25$$

$$a = 3 \quad b = -2$$

$$a = 10 \quad b = -7$$

iki basamaklı

3. $EBOB(16, 24) = 16x + 24y$

$$8 = 16x + 24y$$

$$1 = 2x + 3y$$

$$x = 2, \quad y = -1 \Rightarrow x + y = 2 - 1 = 1$$

4.

Eşit uzunluktaki parçalara ayrılacaktır.

$$Ebob(20, 24, 28) = 4 \text{ m}$$

$$\frac{20}{4} = 5 \text{ parça} \quad \frac{24}{4} = 6 \text{ parça} \quad \frac{28}{4} = 7 \text{ parça}$$

$$5 + 6 + 7 = 18 \text{ parça}$$

CEVAP: C

5. $48 = 2^4 \cdot 3 \quad 60 = 2^2 \cdot 3 \cdot 5 \quad 72 = 2^3 \cdot 3^2$

$$Ekok(48, 60, 72) = 2^4 \cdot 3^2 \cdot 5 = 720$$

CEVAP: D

6.

$$\begin{array}{c} 40 \text{ m} \\ \boxed{32 \text{ m}} \end{array} \quad 32 = 2^5 \\ 40 = 2^3 \cdot 5 \\ Ebob(32, 40) = 2^3 = 8$$

$$\frac{\text{Dikdörtgen alanı}}{\text{Kare alanı}} = \frac{4 \cdot 32 \cdot 40^5}{8^1 \cdot 8^1} = 20$$

CEVAP: B

7. $20 = 2^2 \cdot 5 \quad 24 = 2^3 \cdot 3 \quad 32 = 2^5$

$$Ebob(20, 24, 32) = 2^2 = 4$$

$$\frac{\text{Dikdörtgen prizma hacmi}}{\text{Küp hacmi}} = \frac{5 \cdot 6 \cdot 8}{4 \cdot 4 \cdot 4} = 240 \text{ kutu}$$

CEVAP: D

CEVAP: E

CEVAP: E

CEVAP: B

CEVAP: C

Ebob - Ekok Öklit Algoritması

9. $A = 6! \cdot 5! = 6! \cdot 5 \cdot 4 \cdot 3!$
 $B = 7! \cdot 3! = 7 \cdot 6! \cdot 3!$
 $C = 6! \cdot 4! = 6! \cdot 4 \cdot 3!$
 $Ebob(A, B, C) = 6! \cdot 3!$

CEVAP: C

10. $Ebob(8, 12) = 8a + 12b$
 $4 = 8a + 12b$
 $1 = 2a + 3b \Rightarrow a = -4 \quad b = 3$
 $a - b = -4 - 3$
 $= -7$

CEVAP: A

11. $Ebob(3n + 8, n + 2)$
- | | |
|-----------|---------|
| $3n + 8$ | $n + 2$ |
| $-3n + 6$ | 3 |
| <hr/> | |
| 2 | |
- $\frac{2}{n+2}$ tam bölünmeli
 $n + 2$ ifadesi $\{2, 1, -1, -2\}$ yani 4 değer alabilir.
 $n + 2 = 2 \quad n + 2 = 1 \quad n + 2 = -1 \quad n + 2 = -2$
 $n = 0 \quad n = -1 \quad n = -3 \quad n = -4$
 $n = \{0, -1\}$ olduğu için 2 değer vardır.

CEVAP: B

12. 120 sayısını tam bölen tam sayılar 560 sayısını da tam bölecek ise ortak bölenleri olmalı
 $120 = 2^3 \cdot 5 \cdot 3 \quad Ebob(120, 560) = 2^3 \cdot 5$
 $560 = 7 \cdot 2^4 \cdot 5 \quad$ Tam sayı bölen sayısı $= 2 \cdot 4 \cdot 2 = 16$

CEVAP: E

13. 
 $36 = 2^2 \cdot 3^2 \quad 40 = 2^3 \cdot 5$
 $Ebob(36, 40) = 2^2$

İki ağaç arasındaki mesafe 4 m'dir. Dikdörtgenin çevresi $2 \cdot (36 + 40) = 152$ m ise $\frac{152}{4} = 38$ ağaç dikilir.

CEVAP: D

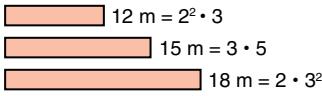
14. $48 = 2^4 \cdot 3 \quad 54 = 2 \cdot 3^3 \quad 72 = 2^3 \cdot 3^2$
 $Ebob(48, 54, 72) = 2 \cdot 3 = 6$
 $\frac{48}{6} = 8 \text{ şışe} \quad \frac{54}{6} = 9 \text{ şışe} \quad \frac{72}{6} = 12 \text{ şışe}$
 $8 + 9 + 12 = 29 \text{ şışe}$

CEVAP: B

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15. $8 = 2^3 \quad 10 = 2 \cdot 5$
 $Ekok(8, 10) = 2^3 \cdot 5 = 40$
bir sonraki katı 80 alırsak

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 $\frac{\text{Kare alanı}}{\text{Dikdörtgen alanı}} = \frac{80 \cdot 80}{8 \cdot 10} = 80$
 $80 - 48 = 32$ tane

CEVAP: C

16. 
 $12 m = 2^2 \cdot 3$
 $15 m = 3 \cdot 5$
 $18 m = 2 \cdot 3^2$

$ebob = 3$ m parça uzunluğu

$$\frac{12}{3} = 4 \text{ parça } 3 \text{ kesim}$$

$$\frac{15}{3} = 5 \text{ parça } 4 \text{ kesim}$$

$$\frac{18}{3} = 6 \text{ parça } 5 \text{ kesim}$$

12 kesim x 3 lira = 36 lira

CEVAP: C



Doğrusal Denklem Sistemleri

Çözüm 1

1. $\frac{3x+7}{2x-4} \times \frac{4}{3}$

$$\begin{aligned} 9x + 21 &= 8x - 16 \\ 9x - 8x &= -16 - 21 \\ x &= -37 \end{aligned}$$

2.

$$\begin{aligned} \frac{2x-1}{3} - \frac{3x+1}{2} &= \frac{x+1}{4} \\ (4) & \quad (6) \quad (3) \\ \frac{8x-4-18x-6}{12} &= \frac{3x+3}{12} \\ -10x-10 &= 3x+3 \\ -10x-3x &= 3+10 \\ -13x &= 13 \\ x &= -1 \end{aligned}$$

CEVAP: B

3.

$$\begin{aligned} 4x - 3y &= -11 \\ 3/2x + y &= -3 \\ \hline 4x - 3y &= -11 \\ + 6x + 3y &= -9 \\ \hline 10x &= -20 \\ x &= -2 \end{aligned}$$

CEVAP: B

5. $3/ \frac{2}{x} - \frac{1}{y} = \frac{1}{3}$

$$\begin{array}{r} \frac{1}{x} + \frac{3}{y} = \frac{1}{6} \\ \hline \frac{6}{x} - \frac{3}{y} = \frac{3}{3} \\ + \frac{1}{x} + \frac{3}{y} = \frac{1}{6} \\ \hline \frac{7}{x} = 1 + \frac{1}{6} \quad \frac{7}{x} = \frac{7}{6} \quad x = 6 \end{array}$$

CEVAP: B

4.

$$\begin{aligned} 2/ \quad 3a - b + 12 &= 0 \\ a + 2b - 3 &= 0 \\ \hline 6a - 2b + 24 &= 0 \\ + a + 2b - 3 &= 0 \\ 7a + 21 &= 0 \\ 7a &= -21 \\ a &= -3 \end{aligned}$$

CEVAP: A

Çözüm 1

6.
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6.

$$\begin{aligned} ax + by &= 12 & (x, y) &= (-2, 3) \\ bx - ay &= -8 & x &= -2 \quad y &= 3 \end{aligned}$$

$$\begin{array}{r} -3/ \quad -2a + 3b = 12 \\ 2/ \quad -2b - 3a = -8 \\ \hline 6a - 9b = -36 \\ + \quad -4b - 6a = -16 \\ \hline -13b = -52 \\ b = 4 \end{array}$$

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CEVAP: B

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CEVAP: D

7.

$$\begin{array}{r} 2x + y = 11 \\ -/ \quad y - x = -7 \\ \hline 2x + y = 11 \\ + \quad -y + x = 7 \\ \hline 3x = 18 \\ x = 6 \end{array}$$

$$\begin{aligned} 2 \cdot 6 + y &= 11 \\ 12 + y &= 11 \\ y &= -1 \\ ax + 2y &= 8 \\ 6a + 2 \cdot (-1) &= 8 \\ 6a &= 10 \\ a &= \frac{10}{6} = \frac{5}{3} \end{aligned}$$

CEVAP: C

CEVAP: A

8. $x = 3b - 5 \quad y = 2b + 4$

$$2x - y + 16 = 0 \quad 4b + 2 = 0$$

$$2(3b - 5) - (2b + 4) + 16 = 0 \quad 4b = -2$$

$$6b - 10 - 2b - 4 + 16 = 0 \quad b = -\frac{2}{4} = -\frac{1}{2}$$

CEVAP: B

Doğrusal Denklem Sistemleri

9. $(a - b + 5) \cdot x + (a + b - 3) \cdot y = 0$

$$\begin{array}{rcl} a - b + 5 = 0 & & -1 - b + 5 = 0 \\ + a + b - 3 = 0 & & \\ \hline 2a + 2 = 0 & & b = 4 \\ 2a = -2 & & a \cdot b = 4 \cdot (-1) \\ a = -1 & & = -4 \end{array}$$

CEVAP: B

10. $(a - 2)x + 3y - 5 = 0$

$$2x + (b + 1)y + 10 = 0$$

Sonsuz çözümü olduğuna göre,

$$\begin{array}{rcl} \frac{a-2}{2} = \frac{3}{b+1} = \frac{-5}{10} & & \\ \frac{a-2}{2} = -\frac{5}{10} & & \frac{3}{b+1} = -\frac{5}{10} \\ 10a - 20 = -10 & & 30 = -5b - 5 \\ 10a = 10 & & 35 = -5b \\ a = 1 & & b = -7 \\ a + b = -7 + 1 = -6 & & \end{array}$$

(x, y) ikilisi $(2, -1)$

11. $(a + 2)x + 3y + 4 = 0$

$$(a - 1)x + 2y - 3 = 0$$

tek çözümü olduğuna göre,

$$\begin{array}{l} \frac{a+2}{a-1} \neq \frac{3}{2} \\ 2a + 4 \neq 3a - 3 \\ 7 \neq a \end{array}$$

12.

$$\begin{array}{l} 2/ \frac{4a+3}{a} + \frac{3b-1}{b} = 11 \\ 3/ \frac{a-2}{a} + \frac{b+3}{b} = -2 \\ \hline \frac{8a+6}{a} + \frac{6b-2}{b} = 22 \\ + \frac{3a-6}{a} + \frac{3b+9}{b} = -6 \\ \hline \frac{11a}{a} + \frac{9b+7}{b} = 16 \\ 11 + \frac{9b}{b} + \frac{7}{b} = 16 \\ 20 + \frac{7}{b} = 16 \\ \frac{7}{b} = -4 \quad b = -\frac{7}{4} \end{array}$$

CEVAP: A

CEVAP: D

13.

$$\begin{array}{rcl} 4x + 5y - z = 13 & & \\ -/ \quad x + 8y + 2z = -11 & & \\ \hline 4x + 5y - z = 13 & & \\ + \quad -x - 8y - 2z = 11 & & \\ \hline 3x - 3y - 3z = 24 & & \\ x - y - z = 8 & & \end{array}$$

CEVAP: A

14.

$$\begin{array}{rcl} 3/ \quad 2x + y - z = 7 & & \\ x + 4y + 3z = 28 & & \\ \hline 6x + 3y - 3z = 21 & & \\ + \quad x + 4y + 3z = 28 & & \\ \hline 7x + 7y = 49 & & \\ x + y = 7 & & \end{array}$$

CEVAP: D

15. I. $2a + b - c = -8$

II. $a + 2b + c = -1$

III. $3a - b + 2c = 1$

I ve II'den

$$\begin{array}{rcl} 2a + b - c = -8 & & \\ + a + 2b + c = -1 & & \\ \hline 3a + 3b = -9 & & \\ a + b = -3 & & \end{array}$$

II ve III'den

$$\begin{array}{rcl} -2/ \quad a + 2b + c = -1 & & \\ + 3a - b + 2c = 1 & & \\ \hline a - 5b = 3 & & \end{array}$$

$$\begin{array}{rcl} -/ \quad a + b = -3 & & \\ + a - 5b = 3 & & \\ \hline -6b = 6 & & \\ b = -1 & & \end{array}$$

CEVAP: C

16.

$$\begin{array}{l} \frac{a-3}{b+2} \times \frac{c+1}{a} \Rightarrow a(a-3) = (b+2)(c+1) \\ \frac{a}{b+3} \times \frac{c-2}{a-3} \Rightarrow a(a-3) = (c-2)(b+3) \\ (b+2)(c+1) = (c-2)(b+3) \\ bc + b + 2c + 2 = bc + 3c - 2b - 6 \\ 3b - c = -8 \end{array}$$

CEVAP: B



1. $x \cdot (8 - z) = y \Rightarrow 8x - x \cdot z = y$
 $\Rightarrow 8x = y + x \cdot z$

$$\left(z + \frac{y}{x}\right) \cdot (y + x \cdot z) = 192$$

$$\left(\frac{xz + y}{x}\right)(y + xz) = 192$$

$$\frac{8x}{x} \cdot 8x = 192$$

$$64x = 192$$

$$x = 3$$

2. $\frac{a}{3 \cdot 7} - \frac{b}{3 \cdot 5} + \frac{c}{5 \cdot 7} = \frac{1}{3}$
 $(5) \quad (7) \quad (3) \quad (5 \cdot 7)$
 $\frac{5a}{3 \cdot 5 \cdot 7} - \frac{7b}{3 \cdot 5 \cdot 7} + \frac{3c}{3 \cdot 5 \cdot 7} = \frac{35}{3 \cdot 5 \cdot 7}$
 $5a - 7b + 3c = 35$

3. $\frac{a \cdot b}{a+b} = \frac{2}{7} \Rightarrow \frac{a+b}{a \cdot b} = \frac{7}{2}$
 $\Rightarrow \frac{1}{a} + \frac{1}{b} = \frac{7}{2}$
 $\frac{b \cdot c}{b+c} = \frac{3}{5} \Rightarrow \frac{b+c}{b \cdot c} = \frac{5}{3}$
 $\Rightarrow \frac{1}{b} + \frac{1}{c} = \frac{5}{3}$
 $\frac{a \cdot c}{a+c} = -\frac{1}{3} \Rightarrow \frac{a+c}{a \cdot c} = -3$
 $\Rightarrow \frac{1}{a} + \frac{1}{c} = -3$

$$\frac{1}{a} + \frac{1}{b} = \frac{7}{2}$$

$$- / \quad \frac{1}{b} + \frac{1}{c} = \frac{5}{3}$$

$$+ \quad \frac{1}{a} + \frac{1}{c} = -3$$

$$\frac{2}{a} = \frac{7}{2} - \frac{5}{3} - \frac{1}{6}$$

$$\frac{2}{a} = \frac{21 - 10 - 18}{6}$$

$$a = \frac{12}{-7}$$

CEVAP: D

4. $x \cdot y = 12$
 $y \cdot z = 15$
 $x \cdot x \cdot z = 5$
 $x^2 y^2 z^2 = 12 \cdot 5 \cdot 15$
 $x \cdot y \cdot z = 30$
 $x \cdot 15 = 30$
 $x = 2$

CEVAP: A

5. $6x + 5y + z = 13$
 $+ 3x + y - z = 5$
 $9x + 6y = 18$
 $3x + 2y = 6$

$$\frac{3x + 2y}{2z - 3x} = \frac{6}{-4} = -\frac{3}{2}$$

$$6x + 5y + z = 13$$
 $- 5/ \quad 3x + y - z = 5$
 $- 9x + 6z = -12$
 $- 3x + 2z = -4$

CEVAP: A

6. $a = \frac{x+y}{x-y} \quad b = \frac{y-z}{y+z}$
 $\frac{1-a}{1+b} = \frac{1 - \frac{x+y}{x-y}}{1 + \frac{y-z}{y+z}} = \frac{\frac{x-y-x-y}{x-y}}{\frac{y+z+y-z}{y+z}}$
 $= \frac{-2y}{x-y} \quad \frac{y+z}{2y} = \frac{y+z}{y-x}$

CEVAP: B

7. $\frac{3x}{xy} - \frac{2y}{xy} = \frac{4xy}{xy}$
 $2/ \quad \frac{3}{y} - \frac{2}{x} = 4$
 $-3/ \quad \frac{2}{y} + \frac{1}{x} = 3$
 $+ \quad \frac{7}{x} = -1$
 $x = 7$

CEVAP: B

8. $y = ax^2 + bx + c$
 $(2, -5)$ noktasından geçiyorsa
 $4a + 2b + c = -5$
 $(-2, 7)$ noktasından geçiyorsa
 $4a - 2b + c = 7$
 $(1, 6)$ noktasından geçiyorsa

$$\begin{array}{rcl} a + b + c = 6 & & 4a + c = 1 \\ 4a + 2b + c = -5 & & - \\ - / \quad 4a - 2b + c = 7 & & - a + c = 9 \\ + & & 3a = -8 \\ & & a = -\frac{8}{3} \end{array}$$

$$c - \frac{8}{3} = 9 \quad c = \frac{35}{3}$$

$$a - b - c = -\frac{8}{3} + 3 - \frac{35}{3} = -\frac{34}{3}$$

CEVAP: E

Doğrusal Denklem Sistemleri

9.
$$\begin{array}{rcl} -2 & \quad 2x + 3y = -1 \\ & 2y - 4z = -18 \\ + & \underline{4x + z = 3} \\ & -4x - 6y = 2 \\ & 2y - 4z = -18 \\ + & \underline{4x + 4z = 12} \\ & -4y = -4 \\ & y = 1 \end{array}$$

CEVAP: D

10.
$$\begin{array}{rcl} x - y = 3 & & y = x - 3 \\ x^2 + 2y = 2 & & \\ x^2 + 2(x - 3) = 2 & & \\ x^2 + 2x - 8 = 0 & & \\ \downarrow & & \downarrow \\ x & +4 & \\ x & -2 & \\ x = -4 & & y = 1 \\ x = 2 & & y = -1 \end{array}$$

CEVAP: C

11.
$$\begin{array}{rcl} 2x + y = 5 & & y = 5 - 2x \\ y^2 - 3x = 10 & & \\ (5 - 2x)^2 - 3x = 10 & & \\ 4x^2 - 23x + 15 = 0 & & \\ \downarrow & & \downarrow \\ x & -5 & \\ 4x & -3 & \\ x = 5, y = 5 - 2.5 & = -5 & \\ x = \frac{3}{4}, y = 5 - 2 \cdot \frac{3}{4} & = \frac{7}{2} & \\ x + y = 5 - 5 & = 0 & \\ x + y = \frac{3}{4} + \frac{7}{2} & = \frac{17}{4} & \\ (1) \quad (2) & & \end{array}$$

CEVAP: E

12.
$$\begin{array}{rcl} x^2 - y^2 + x + y = 20 & & x - y = 3 \\ (x - y)(x + y) + x + y = 20 & + & x + y = 5 \\ (x + y)(x - y + 1) = 20 & & 2x = 8 \\ (x + y) \cdot 4 = 20 & & x = 4 \\ x + y = 5 & & y = 1 \end{array} \quad \left. \begin{array}{l} x = 4 \\ y = 1 \end{array} \right\} (4, 1)$$

CEVAP: B

13.
$$\begin{array}{l} x \cdot y = 8 \Rightarrow y = \frac{8}{x} \\ x + y = 6 \Rightarrow x + \frac{8}{x} = 6 \\ \Rightarrow x^2 + 8 = 6x \\ \Rightarrow x^2 - 6x + 8 = 0 \\ x \rightarrow -4 = 0 \quad x = 4 \quad y = \frac{8}{4} = 2 \\ x \rightarrow -2 = 0 \quad x = 2 \quad y = \frac{8}{2} = 4 \\ \{2, 4\} \end{array}$$

CEVAP: B

14.
$$\begin{array}{l} 3y - x = -1 \Rightarrow x = 3y + 1 \\ 4x^2 + 3y^2 = 19 \\ 4 \cdot (3y + 1)^2 + 3y^2 = 19 \\ 4(9y^2 + 6y + 1) + 3y^2 = 19 \\ 36y^2 + 24y + 4 + 3y^2 = 19 \\ 39y^2 + 24y - 15 = 0 \\ 13y \rightarrow -5 = 0 \quad y = \frac{5}{13} \\ 3y \rightarrow +3 = 0 \quad y = -1 \end{array}$$

CEVAP: C

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15.
$$\begin{array}{ll} x^2 - 2|x| - 15 = 0 & \\ x > 0 & x^2 - 2x - 15 = 0 \\ x \rightarrow -5 = 0 & x = 5 \\ x \rightarrow +3 = 0 & \cancel{x=-3} \\ x < 0 & x^2 + 2x - 15 = 0 \\ x \rightarrow +5 = 0 & x = -5 \\ x \rightarrow -3 = 0 & \cancel{x=3} \\ x \text{ değerleri çarpımı } 5 \cdot (-5) & = -25 \end{array}$$

CEVAP: A

16. (3, -1) noktası $y^2 = ax + b$

$$\begin{array}{l} 1 = 3a + b \\ (-1, 3) \text{ noktası } 9 = -a + b \\ \begin{array}{rcl} 3a + b = 1 & & -(-2) + b = 9 \\ -/- -a + b = 9 & & \\ \hline 4a = -8 & & \\ a = -2 & & a \cdot b = (-2) \cdot (7) \\ & & = -14 \end{array} \end{array}$$

CEVAP: E



İkinci Dereceden Denklemler

Çözüm 1

1. $(x+3)^2 - 2(x+3) - 3 = 0$
 $x^2 + 6x + 9 - 2x - 6 - 3 = 0$
 $x^2 + 4x = 0$
 $x(x+4) = 0$

$x = 0$ ve $x = -4$

Çözüm Kümesi = $\{-4, 0\}$

CEVAP: A

2. $(x+1)(x+3) = (x-2) \cdot (x-1)$
 $x^2 + 3x + x + 3 = x^2 - 2x - x + 2$
 $4x + 3 = -3x + 2$
 $7x = -1$
 $x = -\frac{1}{7}$

3. $\sqrt{2x-5} = x-2$
 Her iki tarafın karesini alırsak
 $\sqrt{2x-5}^2 = (x-2)^2$
 $2x - 5 = x^2 - 4x + 4$
 $x^2 - 6x + 9 = 0$
 $x \rightarrow -3 = 0 \quad x = 3$
 $x \rightarrow -3 = 0 \quad x = 3 \quad \text{Çözüm Kümesi} = \{3\}$

CEVAP: B

4. $x^2 - 4|x| - 21 = 0$
 $x < 0 \quad x^2 + 4x - 21 = 0$
 $x \rightarrow +7 = 0 \quad x = -7$
 $x \rightarrow -3 = 0 \quad x = 3$
 $x > 0 \quad x^2 - 4x - 21 = 0$
 $x \rightarrow -7 = 0 \quad x = 7$
 $x \rightarrow +3 = 0 \quad x = 3$
 x'ler çarpımı = $7 \cdot (-7) = -49$

CEVAP: E

5. $|x^2 - 8| = |x + 2\sqrt{2}|$
 $|x - 2\sqrt{2}| \cdot |x + 2\sqrt{2}| = |x + 2\sqrt{2}|$
 $x + 2\sqrt{2} = 0 \quad |x - 2\sqrt{2}| = 1$
 $x = -2\sqrt{2} \quad x - 2\sqrt{2} = 1 \quad x - 2\sqrt{2} = -1$
 $x = 1 + 2\sqrt{2} \quad x = -1 + 2\sqrt{2}$
 x'ler toplamı = $-2\sqrt{2} + 1 + 2\sqrt{2} - 1 + 2\sqrt{2} = 2\sqrt{2}$

CEVAP: B

6. $\frac{4x+2}{x-4} \times \frac{2x+5}{x+3}$
 $4x^2 + 12x + 2x + 6 = 2x^2 - 8x + 5x - 20$
 $4x^2 + 14x + 6 = 2x^2 - 3x - 20$
 $2x^2 + 17x + 26 = 0$
 $2x \rightarrow 13 = 0 \quad x = -\frac{13}{2}$
 $x \rightarrow 2 = 0 \quad x = -2$
 Çözüm Kümesi = $\left\{-\frac{13}{2}, -2\right\}$

CEVAP: C

7. $\left(\frac{x-3}{4}\right)^2 - 4 \cdot \left(\frac{x-3}{4}\right) + 3 = 0$
 $\frac{x-3}{4} = a \text{ dersek}$
 $a^2 - 4a + 3 = 0$
 $a \rightarrow -3 = 0 \quad a = 3$
 $a \rightarrow -1 = 0 \quad a = 1$
 $\frac{x-3}{4} = 3 \Rightarrow x - 3 = 12 \Rightarrow x = 15$
 $\frac{x-3}{4} = 1 \Rightarrow x - 3 = 4 \Rightarrow x = 7$
 x'ler toplamı $7 + 15 = 22$

CEVAP: D

8. $(x^2 - x)^2 - 8 \cdot (x^2 - x) + 12 = 0$
 $x^2 - x = a \text{ dersek}$
 $a^2 - 8a + 12 = 0$
 $a \rightarrow -6 = 0 \quad a = 6$
 $a \rightarrow -2 = 0 \quad a = 2$
 $x^2 - x = 6 \Rightarrow x^2 - x - 6 = 0$
 $x \rightarrow -3 = 0 \quad x = 3$
 $x \rightarrow +2 = 0 \quad x = -2$

$x^2 - x = 2 \Rightarrow x^2 - x - 2 = 0$
 $x \rightarrow -2 = 0 \quad x = 2$
 $x \rightarrow +1 = 0 \quad x = -1$
 Çözüm Kümesi = $\{-1, 2, -2, 3\}$

1 bulunmaz.

CEVAP: D

İkinci Dereceden Denklemler

9. $x^4 - 2x^2 - 8 = 0$

$$x^2 \rightarrow -4 = 0$$

$$x^2 \rightarrow +2 = 0$$

$$x^2 = 4 \quad \begin{matrix} x=2 \\ x=-2 \end{matrix}$$

$x^2 = -2$ gerçek kök yok.

x 'ler çarpımı = $2 \cdot (-2) = -4$

10. $16^x - 9 \cdot 4^x + 8 = 0$

$4^x = a$ dersek

$$a^2 - 9a + 8 = 0$$

$$a \rightarrow -8 = 0$$

$$a = 8$$

$$a \rightarrow -1 = 0$$

$$a = 1$$

$$4^x = 8 \Rightarrow 2^{2x} = 2^3 \Rightarrow x = \frac{3}{2}$$

$$4^x = 1 \Rightarrow x = 0$$

$$x \text{'ler toplamı } 0 + \frac{3}{2} = \frac{3}{2}$$

11. $x - 2\sqrt{x} - 15 = 0$

$\sqrt{x} = a$ dersek

$$a^2 - 2a - 15 = 0$$

$$a \rightarrow -5 = 0$$

$$a \rightarrow +3 = 0$$

$$a = 5 \quad a = -3$$

$$\sqrt{x} = 5 \Rightarrow x = 25$$

$\sqrt{x} = -3 \Rightarrow$ gerçek kök yok

$\text{Çözüm Kümesi} = \{25\}$

12. $(3x+1)(2x+3) + (3x+1)(x-1) = 0$

$$(3x+1)(2x+3+x-1) = 0$$

$$(3x+1)(3x+2) = 0$$

$$3x+1 = 0 \Rightarrow 3x = -1 \Rightarrow x = -\frac{1}{3}$$

$$3x+2 = 0 \Rightarrow 3x = -2 \Rightarrow x = -\frac{2}{3}$$

$$x \text{'ler toplamı} = \left(-\frac{1}{3}\right) + \left(-\frac{2}{3}\right) = -1$$

CEVAP: B

13. $x + \sqrt{3x+1} = 3$

$$(\sqrt{3x+1})^2 = (3-x)^2$$

$$3x+1 = 9 - 6x + x^2$$

$$x^2 - 9x + 8 = 0$$

$$x \rightarrow -8 = 0$$

$$x \rightarrow -1 = 0$$

$\text{Çözüm Kümesi} = \{1\}$

$x = 8$ denklemi sağlamaz

CEVAP: C

14. $(|x+1|+1)^2 = 2|x+1|+5$

$$|x+1| = a \text{ dersek } (a+1)^2 = 2a+5$$

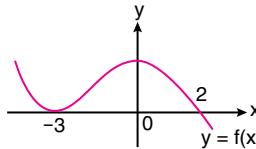
$$a^2 + 2a + 1 = 2a + 5 \Rightarrow a^2 = 4 \quad \begin{matrix} a=2 \\ a=-2 \end{matrix}$$

$$|x+1| = 2 \quad \begin{matrix} x+1 = 2 \Rightarrow x = 1 \\ x+1 = -2 \Rightarrow x = -3 \end{matrix} \quad \text{ÇK} = \{1, -3\}$$

$|x+1| = -2$ kök yok

CEVAP: A

15.



$f(-3)=0$ çift katlı kök grafik yön değiştirmemiş = $(x-3)^2$

$f(2)=0$ tek katlı kök 2'den sonra y değerleri negatif olduğu için = $(2-x)$

$$f(x) = (x-3)^2 \cdot (2-x)$$

$$\frac{(x+1)(x-3)^2 \cdot (2-x)}{x^2-9} = 0$$

$$x+1 = 0 \Rightarrow x = -1$$

$$x-3 = 0 \Rightarrow x = 3 \quad \text{paydayısı sıfır yapar}$$

$$2-x = 0 \Rightarrow x = 2 \quad \text{Çözüm Kümesi} = \{-1, 2\}$$

CEVAP: A

CEVAP: D

16. $x^6 - 26x^3 - 27 = 0$

$x^3 = a$ dersek

$$a^2 - 26a - 27 = 0$$

$$a \rightarrow -27 = 0$$

$$a = 27 \quad a = -1$$

$$x^3 = 27 \quad x^3 = -1$$

$$x = 3 \quad x = -1$$

$\text{Çözüm Kümesi} = \{-1, 3\}$

CEVAP: B

CEVAP: C



İkinci Dereceden Denklemler

Cözüm 2

1. $(x+1)(2x-3)(x+4) = (x+1)(x+4)(x-2)$
 $x+1=0 \quad x+4=0 \quad 2x-3=x-2$
 $x=-1 \quad x=-4 \quad x=1$
 $x'ler çarpımı = (-1) \cdot (-4) \cdot (1) = 4$

CEVAP: C

2. $x - \frac{1}{x^2} - 6 = 0$
 $\frac{1}{x^2} = a$ dersek
 $a^2 - a - 6 = 0$
 $a \rightarrow -3 = 0 \quad a = 3$
 $a \rightarrow +2 = 0 \quad a = -2$
 $\frac{1}{x^2} = 3 \Rightarrow x = 9$
 $\frac{1}{x^2} = -2 \Rightarrow \text{gerçek kök yok.}$
 $x'ler toplamı = 9$

CEVAP: C

3. $y = x^2 + 7x + 3$ ve $y = 2x - 1$
 $x^2 + 7x + 3 = 2x - 1$
 $x^2 + 5x + 4 = 0$
 $x \rightarrow +4 = 0 \quad x = -4$
 $x \rightarrow +1 = 0 \quad x = -1$
 $x'ler toplamı = -4 - 1 = -5$

CEVAP: B

4. $y = x^2 - x - 5$ ve $y = 3x + 7$
 $x^2 - x - 5 = 3x + 7$
 $x^2 - 4x - 12 = 0$
 $x \rightarrow -6 = 0 \quad x = 6 \quad y = 3 \cdot 6 + 7 = 25$
 $x \rightarrow +2 = 0 \quad x = -2 \quad y = 3 \cdot (-2) + 7 = 1$
 $y'ler toplamı = 25 + 1 = 26$

CEVAP: E

5. $y = 3x^2 - x - 5$ ve $y = 5x + m$
 $3x^2 - x - 5 = 5x + m$
 $3x^2 - 6x - 5 - m = 0$
ortak tek kök varsa $\Delta = 0$ 'dır.
 $\Delta = b^2 - 4ac = (-6)^2 - 4 \cdot 3 \cdot (-5-m) = 0$
 $36 + 60 + 12m = 0 \Rightarrow 12m = -96 \Rightarrow m = -8$

CEVAP: B

6. $y = x^2 - 8x + 3$ ve $y = -2x + 1$
 $x^2 - 8x + 3 = -2x + 1$
 $x^2 - 6x + 2 = 0$
 $A(x_1, y_1)$ ve $B(x_2, y_2)$ olsun.

A ve B'nin orta noktası $= \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) = (3, -5)$

$x_1 + x_2 = -\frac{b}{a} = 6 \quad y = -2x + 1 = -6 + 1 = -5$
Toplam = $3 - 5 = -2$

CEVAP: B

7. $\left(x - \frac{10}{x} \right)^2 + 6 \left(x - \frac{10}{x} \right) + 9 = 0$

$x - \frac{10}{x} = a$ dersek

$a^2 + 6a + 9 = 0$

$a \rightarrow +3 = 0 \quad a = -3$

$a \rightarrow +3 = 0 \quad a = -3$

$x - \frac{10}{x} = -3 \Rightarrow x^2 + 3x - 10 = 0$

$x \rightarrow +5 = 0 \Rightarrow x = -5$

$x \rightarrow -2 = 0 \Rightarrow x = 2$

$\mathcal{C}\mathcal{K} = \{-5, 2\}$

CEVAP: C

8. $x^2 - 3y^2 = 13$
 $3/ \quad 4x^2 + y^2 = 65$
 $\underline{+}$

$13x^2 = 208$

$x^2 = 16$

$x = 4$ için $y = 1$ ve $y = -1$

$x = -4$ için $y = 1$ ve $y = -1$

$\{(4, 1), (4, -1), (-4, 1), (-4, -1)\}$ 4 çözümü vardır.

CEVAP: D

İkinci Dereceden Denklemler

9. $\sqrt{x+\sqrt{x-4}}^2 = (2)^2$

$$x + \sqrt{x-4} = 4$$

$$(\sqrt{x-4})^2 = (4-x)^2$$

$$x-4 = 16 - 8x + x^2$$

$$x^2 - 9x + 20 = 0$$

$$x \rightarrow -5 = 0$$

$$x \rightarrow -4 = 0$$

$$x=5 \quad x=4 \quad \text{ÇK} = \{4\}$$

\downarrow denklemi sağlamaz.

10. $(\sqrt{6-x} + \sqrt{6+x})^2 = (2\sqrt{3})^2$

$$6-x + 2\sqrt{(6-x)(6+x)} + 6+x = 12$$

$$2\sqrt{36-x^2} = 0$$

$$36-x^2 = 0$$

$$x^2 = 36 \quad \begin{matrix} x=6 \\ x=-6 \end{matrix}$$

$$x'ler çarpımı = 6 \cdot (-6) = -36$$

11. $x^3 - 7x^2 - 18x = 0$

$$x(x^2 - 7x - 18) = 0$$

$$x = 0$$

$$x^2 - 7x - 18 = 0$$

$$x \rightarrow -9 = 0 \quad x = 9$$

$$x \rightarrow +2 = 0 \quad x = -2$$

$$\text{ÇK} = \{-2, 0, 9\}$$

12. $\frac{x^2}{169} + \frac{y^2}{81} = 1$

$$x = 5 \quad \frac{25}{169} + \frac{y^2}{81} = 1$$

$$\frac{y^2}{81} = 1 - \frac{25}{169} \quad \frac{y^2}{81} = \frac{144}{169}$$

$$\frac{y}{9} = -\frac{12}{13} \quad \frac{y}{9} = \frac{12}{13}$$

$$y = -\frac{108}{13} \quad y = \frac{108}{13}$$

$$A = \left(5, \frac{108}{13}\right) \quad B = \left(5, -\frac{108}{13}\right)$$

$$|AB| = \frac{108}{13} - \left(-\frac{108}{13}\right) = \frac{216}{13}$$

CEVAP: D

13. $(x-3y)^2 - 7(x-3y) + 12 = 0$

$$x-3y = a \text{ dersek}$$

$$a^2 - 7a + 12 = 0$$

$$a \rightarrow -4 = 0$$

$$a \rightarrow -3 = 0$$

$$a = 4 \quad a = 3$$

$$- / \quad x-3y = 4$$

$$+ \quad x+y = 7$$

$$\hline 4y = 3$$

$$y = \frac{3}{4}$$

$$x = \frac{25}{4}$$

$$y = 1$$

$$x = 6$$

$$\text{ÇK} = \left\{ \left(\frac{25}{4}, \frac{3}{4} \right), (6, 1) \right\}$$

CEVAP: D

14. $x^2 - x - 6 = 2x + n$

$$x^2 - 3x - 6 - n = 0 \quad x = -1 \text{ denklemi sağlanlığına göre,}$$

$$1 + 3 - 6 - n = 0 \Rightarrow n = -2$$

$$x^2 - x - 6 = 2x - 2$$

$$x^2 - 3x - 4 = 0$$

$$x \rightarrow -4 = 0$$

$$x \rightarrow +1 = 0$$

A noktası $x = 4$ için

$$y = x^2 - x - 6 = 4^2 - 4 - 6 = 6$$

CEVAP: C

CEVAP: E

Y
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CEVAP: E

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15. $5y - x = -9 \Rightarrow x = 5y + 9$

$$3x^2 - 4y^2 = 44$$

$$3 \cdot (5y + 9)^2 - 4y^2 = 44$$

$$3(25y^2 + 90y + 81) - 4y^2 = 44$$

$$71y^2 + 270y + 199 = 0$$

$$71y \rightarrow 199 = 0$$

$$y \rightarrow 1 = 0$$

$$y = -\frac{199}{71}$$

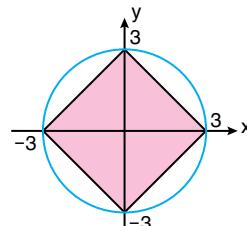
$$y = -1$$

CEVAP: C

16.

$$|x| + |y| = 3$$

$$x^2 + y^2 = 9$$



fonksiyonlar 4 noktada kesiştiği için çözüm kümesi 4 elemanlıdır.

CEVAP: E

CEVAP: A



İkinci Dereceden Eşitsizlikler

Cözüm 1

1. $3x - 8 \geq 0$ $2x + 5 \geq -17$
 $\cancel{3}x \geq \frac{8}{3}$ $-2x \geq -22$
 $x \geq \frac{8}{3}$ ÇK = $\left[\frac{8}{3}, 11\right]$ $x \leq 11$

CEVAP: C

2. $4x - 7 > 5$ $3x + 1 \leq 22$
 $4x > 12$ $3x \leq 21$
 $x > 3$ $x \leq 7$
 $3 < x \leq 7$

x tam sayıları toplamı = $4 + 5 + 6 + 7 = 22$

CEVAP: C

3. $x^2 - 5x < 0$
 $x(x - 5) < 0$
 $x = 0$ $x - 5 = 0$ $x = 5$
 x | 0 5
 x | + 0 - 0 +
ÇK = $(0, 5)$

CEVAP: D

4. $x^2 - x - 12 \geq 0$

$x^2 - x - 12 = 0$ x | -∞ -3 4 ∞
 $x^2 - x - 12 = 0$ + - +
 $x \rightarrow -4 = 0 \Rightarrow x = 4$ ÇK = $(-\infty, -3] \cup [4, \infty)$
 $x \rightarrow +3 = 0 \Rightarrow x = -3$

CEVAP: A

5. $x^2 - 7x \leq -3x + 45$

$x^2 - 4x - 45 \leq 0$
 $x^2 - 4x - 45 = 0$
 $x \rightarrow -9 = 0 \Rightarrow x = 9$
 $x \rightarrow +5 = 0 \Rightarrow x = -5$
 x | -5 9
 x | + 0 - 0 +

ÇK = $[-5, 9]$

x tam sayıları toplamı

= $-5 - 4 + 5 + 6 + 7 + 8 + 9 = 30$

CEVAP: C

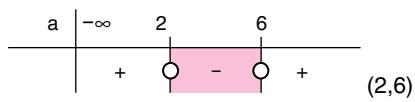
6. $x^2 - (a - 2)x + a - 2 = 0$
her x sayısı için sağlanıyorsa $\Delta < 0$ 'dır.

$\Delta = b^2 - 4ac$

$(a - 2)^2 - 4 \cdot 1 \cdot (a - 2) < 0$

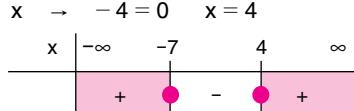
$(a - 2)(a - 6) < 0$

$a = 2$ $a = 6$



CEVAP: B

7. $x^2 + 3x - 28 \geq 0$
 $x \rightarrow +7 = 0$ $x = -7$
 $x \rightarrow -4 = 0$ $x = 4$



ÇK = $(-\infty, -7] \cup [4, \infty)$

x tam sayıları toplamı

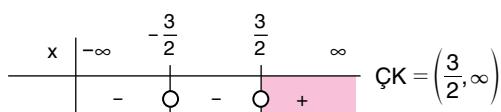
= $-8 - 7 + 4 + 5 + 6 + 7 + 8 + 9 = 15$

CEVAP: E

8. $(2x+3)(4x^2 - 9) > 0$

$2x + 3 = 0$ $4x^2 - 9 = 0$ $x^2 = \frac{9}{4}$
 $x = -\frac{3}{2}$ $x = -\frac{3}{2}$ $x = \frac{3}{2}$

çift katlı kök (işaret değişmez)



CEVAP: C

$\frac{x-3}{4} \leq \frac{1}{x}$

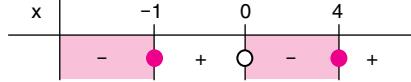
$\frac{x-3}{4} - \frac{1}{x} \leq 0 \Rightarrow \frac{x^2 - 3x - 4}{4x} \leq 0$

$x^2 - 3x - 4 = 0$

$x \rightarrow -4 = 0$ $x = 4$

$x \rightarrow +1 = 0$ $x = -1$

$4x = 0$ $x = 0$



ÇK = $(-\infty, -1] \cup (0, 4]$

CEVAP: D

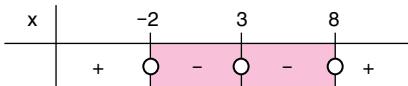
İkinci Dereceden Eşitsizlikler

10. $\frac{(x+2)^3 \cdot (x-8)}{x^2 - 6x + 9} < 0$

$$\begin{aligned} x+2=0 & \quad x-8=0 \\ x=-2 & \quad x=8 \end{aligned}$$

$$\begin{aligned} x^2 - 6x + 9 = 0 \\ x \rightarrow -3 = 0 \quad x = 3 \\ x \rightarrow -3 = 0 \quad x = 3 \end{aligned}$$

Cift katlı kök



$$\text{ÇK} = (-2, 3) \cup (3, 8)$$

x tam sayıları toplamı

$$= -1 + 0 + 1 + 2 + 4 + 5 + 6 + 7 = 24$$

CEVAP: D

11.

$$\frac{x^2 - 3x - 40}{x^2 + 2x - 63} \leq 0$$

$$x^2 + 2x - 63$$

$$x^2 - 3x - 40 = 0$$

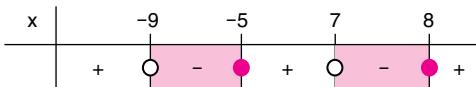
$$x \rightarrow -8 = 0 \quad x = 8$$

$$x \rightarrow +5 = 0 \quad x = -5$$

$$x^2 + 2x - 63 = 0$$

$$x \rightarrow +9 = 0 \quad x = -9$$

$$x \rightarrow -7 = 0 \quad x = 7$$



$$\text{ÇK} = (-9, -5] \cup (7, 8]$$

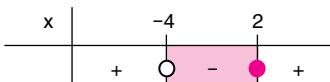
$$\text{x tam sayıları toplamı} = -8 - 7 - 6 - 5 + 8 = -18$$

CEVAP: B

12. $\frac{3x-6}{x+4} \leq 0$

$$3x - 6 = 0 \Rightarrow x = 2$$

$$x + 4 = 0 \Rightarrow x = -4$$



$$\text{ÇK} = (-4, 2]$$

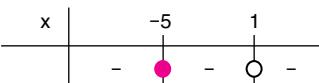
CEVAP: A

13. $\frac{(x+5)(x^2 + 4x - 5)}{1-x} \geq 0$

$$\begin{aligned} x+5 = 0 & \quad 1-x = 0 \\ x = -5 & \quad x = 1 \end{aligned}$$

$$\begin{aligned} x^2 + 4x - 5 = 0 \\ x \rightarrow +5 = 0 \\ x \rightarrow -1 = 0 \end{aligned}$$

$$\begin{aligned} x = -5 \text{ çift katlı kök} \\ x = 1 \text{ çift katlı kök} \end{aligned}$$



$$\text{ÇK} = \{-5\}$$

CEVAP: B

14. $-3 < x^2 + 4x \leq 5$

$$0 < x^2 + 4x + 3$$

$$x^2 + 4x + 3 = 0$$

$$x \rightarrow +3 = 0 \quad x = -3$$

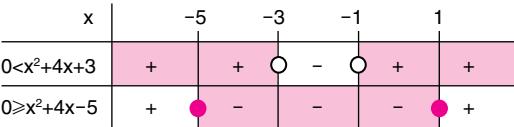
$$x \rightarrow +1 = 0 \quad x = -1$$

$$x^2 + 4x - 5 \leq 0$$

$$x \rightarrow +5 = 0$$

$$x \rightarrow -1 = 0$$

$$x = -5 \quad x = 1$$



$$\text{ÇK} = [-5, -3] \cup (-1, 1]$$

$$\text{x tam sayıları} = -5, -4, 0, 1 \quad 4 \text{ tane.}$$

CEVAP: B

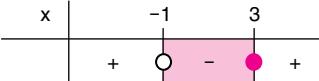
15. $\frac{(x^2 + 2x + 4) \cdot (x-3)^2}{(x^2 - 2x - 3)} \leq 0$

$$x^2 + 2x + 4 = 0 \Rightarrow \Delta < 0 \Rightarrow \text{gerçek kök yok}$$

$$x^2 - 2x - 3 = 0$$

$$x \rightarrow -3 = 0 \quad x = 3$$

$$x \rightarrow +1 = 0 \quad x = -1$$



$$\text{ÇK} = (-1, 3) \text{ en büyük x tam sayısı 2 dir.}$$

CEVAP: B

16. $\frac{x^2 - 64}{4 - 3\sqrt{5}} > 4 + 3\sqrt{5}$

$$x^2 - 64 < (4 - 3\sqrt{5})(4 + 3\sqrt{5})$$

$$x^2 - 64 < 16 - 45$$

$$x^2 < 36$$

$$|x| < 6 \Rightarrow -6 < x < 6$$

$$11 \text{ tane tam sayı var.}$$

CEVAP: C



İkinci Dereceden Eşitsizlikler

Cözüm 2

1. $\frac{7-x}{x-2} \leq 0$ ① $\frac{-4}{x^2-9} \leq 0$ ②

$$7-x=0 \Rightarrow x=7$$

$$x^2-9=0$$

$$x^2=9 \Rightarrow x=3, x=-3$$

x	-3	2	3	7	
I	-	-	○	+	+
II	+	○	-	○	+

$$\mathcal{C}K = (-\infty, -3) \cup [7, \infty)$$

x tam sayıları toplamı

$$\dots -8 -7 -6 -5 -4 +7 +8 \dots = -15$$

CEVAP: B

3. $f(x) = x^2 - 2x - 3$

$$f(3x+1) \leq f(4)$$

$$(3x+1)^2 - 2 \cdot (3x+1) - 3 \leq 4^2 - 2 \cdot 4 - 3$$

$$9x^2 + 6x + 1 - 6x - 2 - 3 \leq 16 - 8 - 3$$

$$9x^2 \leq 9$$

$$x^2 \leq 1$$

$$|x| \leq 1$$

$$-1 \leq x \leq 1$$

$$x \text{ tam sayıları toplamı} = -1 + 0 + 1 = 0$$

CEVAP: C

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2.

$$x^2 - 25 > 0$$

$$x^2 - 25 = 0$$

$$x^2 = 25 \Rightarrow x = 5, x = -5$$

$$x^2 + 4x - 24 < 0$$

$$x^2 + 2x - 24 = 0$$

$$x \rightarrow +6 = 0$$

$$x \rightarrow -4 = 0$$

$$x = -6, x = 4$$

x	-6	-5	4	5
I	+	+	-	-
II	+	○	-	○

$$\mathcal{C}K = (-6, -5)$$

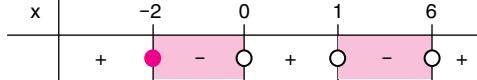
CEVAP: A

4. Grafikten $f(1) = 0$ $\frac{x+2}{x \cdot f(x)} \leq 0$

$$f(6) = 0$$

$$x+2 = 0 \Rightarrow x = -2$$

$$x = 0$$



$$\mathcal{C}K = [-2, 0) \cup (1, 6)$$

$$x \text{ tam sayıları } \{-2, -1, 2, 3, 4, 5\} \text{ 6 tane dir.}$$

CEVAP: C

İkinci Dereceden Eşitsizlikler

5. $x^2 + (a - 3)x - 3a = 0$

$$x_1 + x_2 = -\frac{b}{a} = -\frac{(a-3)}{1} = 3 - a \text{ ve } x_1 \cdot x_2 = \frac{c}{a} = -3a$$

$$x_1^2 x_2 + x_1 x_2^2 < 12$$

$$x_1 x_2 (x_1 + x_2) < 12$$

$$-3a + a^2 < 4 \Rightarrow a^2 - 3a - 4 < 0$$

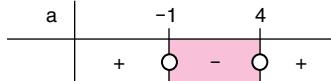
$$a^2 - 3a - 4 = 0$$

$$a \rightarrow -4 = 0$$

$$a \rightarrow +1 = 0$$

$$a = 4 \quad a = -1$$

$$\text{a tam sayıları toplamı} = 0 + 1 + 2 + 3 = 6$$



$$\text{ÇK} = (-1, 4)$$

CEVAP: D

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6. $x^2 - (m+3)x + m - 5 = 0$

$$x_1 + x_2 = -\frac{b}{a} = m + 3$$

$$x_1 x_2 = \frac{c}{a} = m - 5$$

$$x_1 < 0 < x_2 \quad |x_1| < x_2$$

$$x_1 x_2 < 0 \quad x_1 + x_2 > 0$$

$$m - 5 < 0 \quad m + 3 > 0$$

$$m < 5 \quad m > -3$$

$m \in (-3, 5) \rightarrow 7 \text{ tane m tam sayı değeri var.}$

CEVAP: C

7. $x^2 - 7nx + m - 3 = 0$

$$x_1 + x_2 = -\frac{b}{a} = 7n$$

$$x_1 x_2 = \frac{c}{a} = n - 3$$

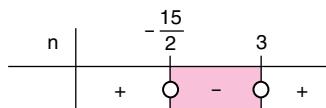
$$\frac{1}{x_1} + \frac{1}{x_2} < 5 \Rightarrow \frac{x_1 + x_2}{x_1 x_2} < 5 \\ (\frac{1}{x_1}) (\frac{1}{x_2})$$

$$\Rightarrow \frac{7n}{n-3} < 5 \Rightarrow \frac{7n}{n-3} - 5 < 0$$

$$\Rightarrow \frac{7n - 5n + 15}{n-3} < 0 \Rightarrow \frac{2n + 15}{n-3} < 0$$

$$2n + 15 = 0 \quad n - 3 = 0$$

$$n = -\frac{15}{2} \quad n = 3$$



n 'nin en büyük değeri 2'dir.

CEVAP: C

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8. $(a+2)x^2 + 7(a+3)x + 6(a-4) = 0$

$$x_1 + x_2 = -\frac{b}{a} = -\frac{7(a+3)}{a+2}$$

$$x_1 x_2 = \frac{c}{a} = \frac{6(a-4)}{a+2}$$

$$x_1 < 0 < x_2 \quad |x_1| > x_2$$

$$x_1 x_2 < 0 \quad x_1 + x_2 < 0$$

$$\text{(I)} \quad \frac{6(a-4)}{a+2} < 0$$

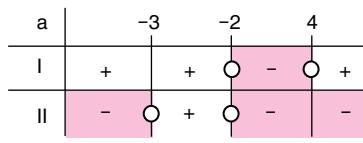
$$a - 4 = 0 \rightarrow a = 4$$

$$a + 2 = 0 \rightarrow a = -2$$

$$\text{(II)} \quad \frac{-7(a+3)}{a+2} < 0$$

$$a + 3 = 0 \Rightarrow a = -3$$

$$a + 2 = 0 \Rightarrow a = -2$$



a değer aralığı $(-2, 4)$

a tam sayıları toplamı $= -1 + 0 + 1 + 2 + 3 = 5$

CEVAP: D

9. $x^2 + (m+3) \cdot x - 5 = 0$

$$x_1 + x_2 = -\frac{b}{a} = -\frac{(m+3)}{1} = -m - 3$$

$$x_1 x_2 = \frac{c}{a} = -5$$

$$x_1^2 + x_2^2 < 26 \Rightarrow (x_1 + x_2)^2 - 2x_1 x_2 < 26$$

$$\Rightarrow (-m-3)^2 - 2 \cdot (-5) < 26$$

$$\Rightarrow (m+3)^2 < 16 \Rightarrow |m+3| < 4$$

$$\Rightarrow -4 < m+3 < 4 \Rightarrow -7 < m < 1 \Rightarrow (-7, 1)$$

CEVAP: E

11.

$$x^2 \leq 5x \quad \textcircled{I}$$

$$\frac{1}{x-3} \leq \frac{1}{x+1} \quad \textcircled{II}$$

$$x^2 - 5x \leq 0$$

$$\frac{1}{x-3} - \frac{1}{x+1} \leq 0$$

$$x(x-5) \leq 0$$

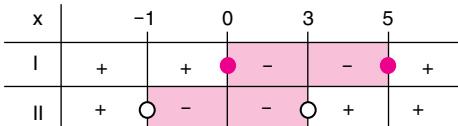
$$\frac{x+1-x+3}{(x-3)(x+1)} \leq 0$$

$$x = 0$$

$$\frac{4}{(x-3)(x+1)} \leq 0$$

$$x = 5$$

$$x = 3 \quad x = -1$$



$$\mathcal{C}K = [0, 3)$$

$$x \text{ doğal sayıları toplamı} = 0 + 1 + 2 = 3$$

CEVAP: A

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10. $ax^2 + bx + c = 0$

$$x_1 < 0 < x_2 \quad \text{ve} \quad |x_1| > x_2$$

$$x_1 x_2 < 0 \quad x_1 + x_2 < 0$$

$$\frac{c}{a} < 0 \quad -\frac{b}{a} < 0$$

$$a = + \quad c = - \quad b = +$$

$$x^2 + 7x - 3 = 0$$

CEVAP: C

12. $(x-1)x^2 - 2(a+1)x - 1 < 0$

$$a-1 < 0$$

$$\Delta < 0$$

$$a < 1$$

$$b^2 - 4ac < 0$$

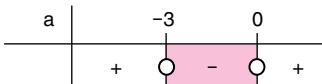
$$[-2(a+1)]^2 - 4 \cdot (a-1)(-1) < 0$$

$$4(a^2 + 2a + 1) + 4(a-1) < 0$$

$$a^2 + 3a < 0$$

$$a(a+3) < 0$$

$$a = 0 \quad a = -3$$



$$a \text{ değer aralığı } (-3, 0)$$

CEVAP: E

İkinci Dereceden Eşitsizlikler

13. $x^2 - (a+3)x + a - 7 = 0$

$$x_1 + x_2 = -\frac{b}{a} = a + 3$$

$$x_1 x_2 = a - 7$$

pozitif iki kök var ise

$$x_1 x_2 > 0 \quad x_1 + x_2 > 0$$

$$a - 7 > 0 \quad a + 3 > 0$$

$$a > 7 \quad a > -3$$

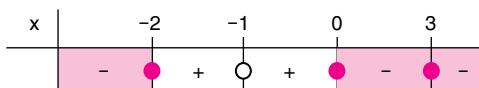
a değer aralığı $(7, \infty)$ en küçük a tam sayısı = 8

CEVAP: D

14. Grafikte $f(-2) = 0 \quad f(-1) = 0 \quad f(3) = 0$ (çift katlı kök)

$g(-1) = 0$ (çift katlı kök)

$$\frac{x \cdot f(x)}{g(x)} \leq 0 \quad x = 0$$



$$\mathcal{CK} = (-\infty, -2] \cup [0, \infty)$$

x tam sayıları toplamı

$$= \dots -3 - 2 + 0 + 1 + 2 + 3 + \dots = 1$$

CEVAP: D

15. $3x^2 + 11x - 7 = 0$

$$x_1 x_2 = \frac{c}{a} = -\frac{7}{3}$$

$$x_1 + x_2 = -\frac{b}{a} = -\frac{11}{3}$$

köklerden biri pozitif biri negatiftir, yani ters işaretlidir.

CEVAP: E

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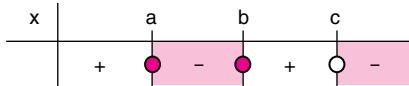
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16.

$$a < b < c \quad \frac{(x-a)(b-x)}{x-c} \leq 0$$

$$x - a = 0 \quad b - x = 0 \quad x - c = 0$$

$$x = a \quad x = b \quad x = c$$



$$\mathcal{CK} = [a, b] \cup (c, \infty)$$

CEVAP: E



İkinci Dereceden Eşitsizlikler

Çözüm 3

1. $\frac{\sqrt{x-4}}{x-7} \leq 0$

$$\begin{aligned} x-7 < 0 & \quad x-4 \geq 0 \\ x < 7 & \quad x \geq 4 \end{aligned}$$

$$\mathcal{C}\mathcal{K} = [4, 7)$$

$$x \text{ tam sayıları toplamı} = 4 + 5 + 6 = 15$$

CEVAP: C

Y A R G I
Y A Y I N E V İ

3. $\frac{|x+2|+7}{|x-1|-5} < 0$

$|x+2|+7$ her zaman pozitiftir.

$$|x-1|-5 < 0 \Rightarrow |x-1| < 5$$

$$\Rightarrow -5 < x-1 < 5 \Rightarrow -4 < x < 6$$

$$\mathcal{C}\mathcal{K} = (-4, 6)$$

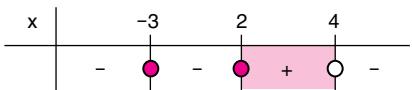
CEVAP: A

2.

$$\frac{|x+3| \cdot |x-2|}{4-x} \geq 0$$

$$\begin{aligned} x+3=0 & \quad x-2=0 & 4-x=0 \\ x=-3 & \quad x=2 & x=4 \end{aligned}$$

(çift katlı kök)



$$\mathcal{C}\mathcal{K} = [2, 4) \cup \{-3\}$$

$$x \text{ tam sayıları toplamı} = -3 + 2 + 3 = 2$$

CEVAP: B

4.

$$\frac{(x^2+5) \cdot |x-2|}{3^{x-1} \cdot (x-3)} < 0$$

$(x^2+5), |x-2|, 3^{x-1}$ her zaman pozitif.

$$x-3 < 0 \Rightarrow x < 3$$

$$x=2 \text{ değeri } |x-2|$$

ifadesini 0 yaptığı için olmaz.

$$x \text{ en büyük tam sayı} = 1$$

CEVAP: B

İkinci Dereceden Eşitsizlikler

5. $\frac{x+5}{x-4} \geq \frac{x+4}{x-5}$

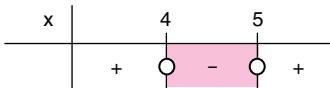
$$\frac{x+5}{x-4} - \frac{x+4}{x-5} \geq 0$$

$$\frac{x^2 - 25 - x^2 + 16}{(x-4)(x-5)} \geq 0$$

$$\frac{-9}{(x-4)(x-5)} \geq 0 \Rightarrow (x-4)(x-5) < 0$$

$$x-4=0 \quad x-5=0$$

$$x=4 \quad x=5$$



$$\text{ÇK} = (4, 5)$$

CEVAP: C

7.

$$\left(\frac{1}{9}\right)^{x^2-2x} \geq \left(\frac{1}{27}\right)^{x-2}$$

$$2x^2 - 4x \leq 3x - 6$$

$$2x^2 - 7x + 6 \leq 0$$

$$\left(\left(\frac{1}{3}\right)^2\right)^{x^2-2x} \geq \left(\left(\frac{1}{3}\right)^3\right)^{x-2}$$

$$2x^2 - 7x + 6 = 0$$

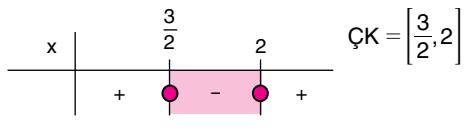
$$2x \rightarrow -3 = 0$$

$$x = \frac{3}{2}$$

$$\left(\frac{1}{3}\right)^{2x^2-4x} \geq \left(\frac{1}{3}\right)^{3x-6}$$

$$x \rightarrow -2 = 0$$

$$x = 2$$



$$\text{ÇK} = \left[\frac{3}{2}, 2\right]$$

CEVAP: B

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8.

$$(x+5)(x+1) \geq 0 \quad \text{①}$$

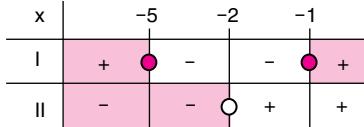
$$x+5=0 \quad x+1=0$$

$$x=-5 \quad x=-1$$

$$(x+2)(x^2+3) < 0 \quad \text{②}$$

$$x+2=0 \quad x^2+3=0$$

$$x=-2 \quad \text{kök yok.}$$



$$\text{ÇK} = (-\infty, -5]$$

en büyük x tam sayısı = -5

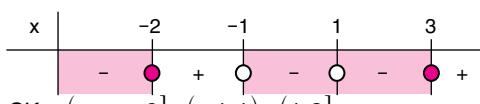
CEVAP: B

9. Grafikten $f(-2) = 0$ $f(1) = 0$

$$f(3) = 0 \quad \frac{f(x)}{x^2 - 1} \leq 0$$

$$x^2 - 1 = 0 \Rightarrow x^2 = 1 \Rightarrow x = 1 \quad x = -1$$

↓
çift katlı kök



$$\text{ÇK} = (-\infty, -2] \cup (-1, 1) \cup (1, 3]$$

en büyük x tam sayısı = 3

CEVAP: D

10. $\frac{b-x}{2x+a} \geq 0$

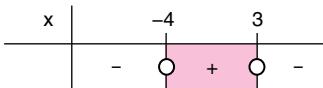
Çözüm kümesi $(-2, 3]$ ise $x = 3$ pay kökü $b - 3 = 0$

$$b = 3 \quad x = -2 \quad \text{payda kökü } -4 + a = 0 \quad a = 4$$

$$a \cdot b = 3 \cdot 4 = 12$$

CEVAP: D

- 11.



kökleri $x = -4$ ve $x = 3$

x^2 katsayısi negatif çözüm kümesi pozitif ise büyük sıfırdır ve eşitlik yok.

$$-(x+4)(x-3) > 0$$

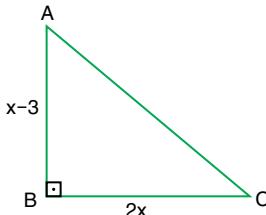
$$x^2 + x - 12 < 0$$

$$-x^2 - x + 12 > 0$$

CEVAP: E

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- 12.



$$A(\widehat{ABC}) < 28$$

$$\frac{(x-3)2x}{2x} < 28$$

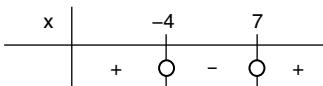
$$x^2 - 3x < 28$$

$$x^2 - 3x - 28 < 0$$

$$x^2 - 3x - 28 = 0$$

$$x \rightarrow -7 = 0 \quad x = 7$$

$$x \rightarrow +4 = 0 \quad x = -4$$



$$\text{ÇK} = (-4, 7)$$

en büyük x tam sayısı = 6

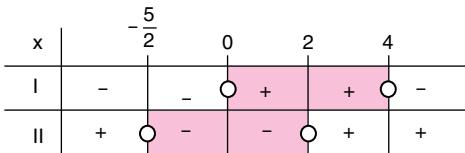
CEVAP: B

İkinci Dereceden Eşitsizlikler

13.

$$\textcircled{1} \quad x(4-x) > 0 \\ x = 0 \quad 4 - x = 0 \\ x = 4$$

$$\textcircled{11} \quad (2x+5)(x-2) < 0 \\ 2x+5 = 0 \quad x-2 = 0 \\ x = -\frac{5}{2} \quad x = 2$$



$$\mathcal{CK} = (0, 2) = (a, b)$$

$$a = 0 \quad b = 2 \quad a + b = 2$$

CEVAP: C

14.

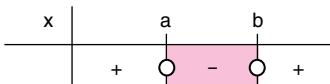
$$a < 0 < b \quad \frac{x^2 - (a+b)x + a \cdot b}{ax^2 - b} > 0$$

$$x^2 - (a+b)x + a \cdot b = 0$$

$$x \rightarrow -a = 0 \quad x = a$$

$$x \rightarrow -b = 0 \quad x = b$$

$$ax^2 - b = 0 \Rightarrow x^2 = \frac{b}{a} \quad (-) \text{ gerçek kök yok.}$$

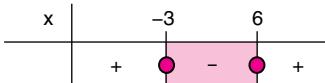


$$\mathcal{CK} = (a, b)$$

CEVAP: A

15.

$$f(x) \cdot (x+1) < 0 \quad \mathcal{CK} = (-\infty, -3) \cup (-1, 6) \\ f(x) = 0 \quad x = -3 \text{ ve } x = 6 \text{ denklemin kökleridir.} \\ x+1=0 \\ x=-1 \quad f(x) = a(x+3)(x-6) \Rightarrow a > 0 \\ f(x) \leq 0$$



$$\mathcal{CK} = [-3, 6]$$

x tam sayıları toplamı

$$= -3 - 2 - 1 + 0 + 1 + 2 + 3 + 4 + 5 + 6 = 15$$

CEVAP: C

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$$16. \quad (3x-1)^2 \leq 64$$

$$|3x-1| \leq 8$$

$$-8 \leq 3x-1 \leq 8$$

$$-7 \leq 3x \leq 9$$

$$-\frac{7}{3} \leq x \leq 3$$

$$\mathcal{CK} = \left[-\frac{7}{3}, 3 \right]$$

CEVAP: E



Trigonometri

Çözüm 1

1.
$$\begin{array}{r} 1930 \\ \underline{-1800} \\ \hline 130 \end{array}$$

esas ölçüsü = 130°

CEVAP: D

2. $-\frac{77\pi}{5}$ esas ölçüsü
$$\begin{array}{r} -77 \\ \underline{+80} \\ \hline 3 \end{array}$$

 $= \frac{3\pi}{5}$ dir.

CEVAP: A

3.
$$\begin{array}{r} -2700 \\ \underline{+2880} \\ \hline 180 \end{array}$$

 $180^\circ = \pi$ esas ölçüsü

CEVAP: D

4. ABC üçgenin iç açıları toplamı $180^\circ = 179^\circ 60'$ ve
 $1^\circ = 60'$

$$\begin{array}{r} 53^\circ 36' \\ 60^\circ 47' \\ \hline 113^\circ 83' = 114^\circ 23' \end{array} \quad \begin{array}{r} 179^\circ 60' \\ 114^\circ 23' \\ \hline 65^\circ 37' \end{array}$$

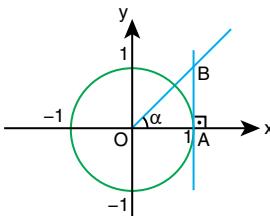
CEVAP: B

5. $55^\circ 33'$ açısı $60 \cdot 55 + 33 = 3333$

CEVAP: D

6. $38^\circ 42' \quad \frac{\pi}{2} = 90^\circ$
 $\underline{+ 90^\circ 00'}$
 $\hline 128^\circ 42'$
 $\underline{- 128^\circ 42'}$
 $\hline 51^\circ 18'$

CEVAP: E



$$\begin{aligned} |AB| &= \tan \alpha & |OA| &= 1 \\ |OA|^2 + |AB|^2 &= |OB|^2 & 1 + \tan^2 \alpha &= |OB|^2 \\ 1 + \tan^2 \alpha &= |OB|^2 & \sqrt{1 + \tan^2 \alpha} &= |OB| \end{aligned}$$

CEVAP: A

8. $4 \cdot \sin(3x) = 13 - 2m \quad \sin(3x) = \frac{13 - 2m}{4}$

$-1 \leq \sin(3x) \leq 1$

$-1 \leq \frac{13 - 2m}{4} \leq 1$

$-4 \leq 13 - 2m \leq 4$

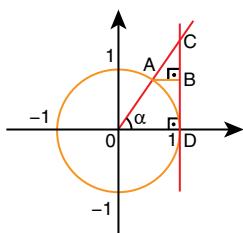
$-17 \leq -2m \leq 9$

$\frac{17}{2} \geq m > \frac{9}{2}$

m değerleri {5, 6, 7, 8} 4 tanedir.

CEVAP: B

9.



$$\begin{aligned} |CD| &= \tan \alpha \\ |BD| &= \sin \alpha \\ |CB| &= \tan \alpha - \sin \alpha \end{aligned}$$

CEVAP: A

10. a = $\sin 153^\circ = 2.$ bölge (+)
 b = $\cos 200^\circ = 3.$ bölge (-)
 c = $\tan 187^\circ = 3.$ bölge (+)
 d = $\cot 315^\circ = 4.$ bölge (-)

13. a) $\sin \frac{\pi}{2} = 0$ yanlış 1 dir.
 b) $\cos \frac{3\pi}{2} = -1$ yanlış 0 dir.
 c) $\sin 2\pi = 1$ yanlış 0 dir.
 d) $\sin \frac{3\pi}{2} = 1$ yanlış -1 dir.
 e) $\cos \pi = -1$ doğru

CEVAP: E

11. I. $\frac{1}{\sec x} = \frac{1}{\frac{1}{\cos x}} = \cos x$
 II. $\cot x \cdot \sin x = \frac{\cos x}{\sin x} \cdot \sin x = \cos x$
 III. $\tan x \cdot \cosec x = \frac{\sin x}{\cos x} \cdot \frac{1}{\sin x} = \frac{1}{\cos x}$

I ve II

CEVAP: B

14. a) $\sin 180 = -1$ yanlış 0 dir.

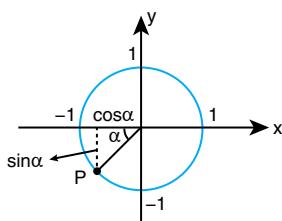
CEVAP: A

12. a = $\cos 47^\circ$
 b = $\sin 56^\circ = \cos 34^\circ$
 c = $\cot 37^\circ = \tan 53^\circ$
 a < b < c

CEVAP: C

15. $0 < x < y < \frac{\pi}{4}$
 I. bölgede açı büyündükçe sin ve tan değerleri artar. cos ve cot değerleri azalır. $\tan x < \tan y$ doğrudur.

CEVAP: B



$$\begin{aligned} P(x, y) \\ x = \cos \alpha \\ y = \sin \alpha \end{aligned}$$

3. bölgедe olduğu için $P(-\cos \alpha, -\sin \alpha)$

CEVAP: A

CEVAP: E



$$1. \frac{\cos^2 x}{1 - \sin x} - \sin x = \frac{1 - \sin^2 x}{1 - \sin x} - \sin x \\ = \frac{(1 - \sin x)(1 + \sin x)}{1 - \sin x} - \sin x = 1 + \sin x - \sin x = 1$$

CEVAP: A

$$5. \frac{\tan x - 1}{1 - \cot x} = \frac{\tan x - 1}{1 - \frac{1}{\tan x}} \quad [\tan x \cdot \cot x = 1] \\ = \frac{\tan x - 1}{\frac{\tan x - 1}{\tan x}} = \tan x$$

CEVAP: C

$$2. \frac{\cos x}{1 + \sin x} - \frac{1 - \sin x}{\cos x} \\ = \frac{\cos^2 x - (1 - \sin x)(1 + \sin x)}{(1 + \sin x) \cdot \cos x} = \frac{\cos^2 x - \cos^2 x}{(1 + \sin x) \cdot \cos x} = 0$$

CEVAP: A

$$6. \frac{(\cos x - \sin x)^2}{\sin x} + \frac{2\cos x}{1} \\ = \frac{\cos^2 x - 2\cos x \sin x + \sin^2 x + 2\cos x \sin x}{\sin x} \\ = \frac{1}{\sin x} = \text{cosecx}$$

CEVAP: A

$$3. 0 < x < \frac{\pi}{2} \rightarrow \text{I. bölge}$$

$$9^{\sin x} = (\sqrt{3})^{\cos x}$$

$$(3^2)^{\sin x} = \left(3^{\frac{1}{2}}\right)^{\cos x}$$

$$3^{2\sin x} = 3^{\frac{\cos x}{2}}$$

$$2\sin x = \frac{\cos x}{2} \Rightarrow \frac{\sin x}{\cos x} = \frac{1}{4}$$

$$\Rightarrow \tan x = \frac{1}{4}$$

CEVAP: E

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$$7. \frac{\sin^2 x \cdot 1 + \cos x}{\sec x - 1 \cdot \tan x} \\ = \frac{1 - \cos^2 x}{\frac{1}{\cos x} - 1} \cdot \frac{\frac{\sin x}{\cos x}}{1 + \cos x} \\ = \frac{(1 - \cos x)(1 + \cos x)}{\frac{1 - \cos x}{\cos x}} \cdot \frac{\sin x}{\cos x} \cdot \frac{1}{1 + \cos x} = \sin x$$

CEVAP: A

$$4. \frac{3\cos^2 x + 2\sin^2 x}{4\cos^2 x + \sin^2 x + 5} \quad [\sin^2 x + \cos^2 x = 1]$$

$$= \frac{3(1 - \sin^2 x) + 2\sin^2 x}{4(1 - \sin^2 x) + \sin^2 x} \\ = \frac{3 - 3\sin^2 x + 2\sin^2 x}{4 - 4\sin^2 x + \sin^2 x + 5} = \frac{3 - \sin^2 x}{9 - 3\sin x} = \frac{1}{3}$$

CEVAP: D

$$8. 0 < x < \frac{\pi}{2} \text{ I. bölge}$$

$$\frac{\sin x + \cos x}{3\sin x - \cos x} \neq \frac{2}{3}$$

$$3\sin x + 3\cos x = 6\sin x - 2\cos x$$

$$\frac{5\cos x}{\sin x} = \frac{3\sin x}{\sin x}$$

$$\cot x = \frac{3}{5}$$

CEVAP: B

Trigonometri

9. $(\sin x + \cos x)^2 = \left(\frac{1}{3}\right)^2$

$$\sin^2 x + 2\sin x \cos x + \cos^2 x = \frac{1}{9}$$

$$1 + 2\sin x \cos x = \frac{1}{9}$$

$$2\sin x \cos x = \frac{1}{9} - 1$$

$$2\sin x \cos x = -\frac{8}{9} \Rightarrow \sin x \cos x = -\frac{4}{9}$$

10. $(\tan x + \cot x)^2 = \left(\frac{4}{3}\right)^2$

$$\tan^2 x + 2\tan x \cot x + \cot^2 x = \frac{16}{9}$$

$$\tan x \cdot \cot x = 1 \quad \tan^2 x + \cot^2 x = \frac{16}{9} - 2$$

$$\tan^2 x + \cot^2 x = -\frac{2}{9}$$

11. $\sin 30^\circ + \cos 60^\circ + \tan 45^\circ$

$$= \frac{1}{2} + \frac{1}{2} + 1 = 2$$

12. $\tan\left(\frac{3\pi}{4}\right) + \cot\left(\frac{5\pi}{4}\right) + \cos\left(\frac{5\pi}{6}\right)$
 $= \tan(135^\circ) + \cot(225^\circ) + \cos(150^\circ)$
 $= -\tan 45^\circ + \cot 45^\circ - \cos 30^\circ$
 $= -1 + 1 - \frac{\sqrt{3}}{2} = -\frac{\sqrt{3}}{2}$

13. $\frac{\sin 330^\circ \cdot \cos 225^\circ}{\tan 300^\circ \cdot \cot 150^\circ}$

$$= \frac{(-\sin 30^\circ) \cdot (-\cos 45^\circ)}{(-\tan 60^\circ) \cdot (-\cot 30^\circ)} = \frac{\frac{1}{2} \cdot \frac{\sqrt{2}}{2}}{\sqrt{3} \cdot \sqrt{3}} = \frac{\sqrt{2}}{4} \cdot \frac{1}{3} = \frac{\sqrt{2}}{12}$$

CEVAP: E

CEVAP: C

14. $\sin\left(\frac{3\pi}{2} + x\right) = \cos\left(\frac{\pi}{2} + x\right)$

$$-\cos x = -\sin x$$

$$\frac{\cos x}{\sin x} = \frac{\sin x}{\sin x} \Rightarrow \cot x = 1$$

CEVAP: E

CEVAP: C

15. $\sin(\pi + x) + \cos(\pi - x) + \sin\left(\frac{\pi}{2} + x\right)$

$$= -\sin x - \cos x + \cos x = -\sin x$$

CEVAP: A

CEVAP: E

16. $\alpha = \frac{\pi}{16} \Rightarrow 16\alpha = \pi \Rightarrow 8\alpha = \frac{\pi}{2}$

$$3\alpha + 5\alpha = 8\alpha = \frac{\pi}{2}$$

$$7\alpha + \alpha = 8\alpha = \frac{\pi}{2}$$

$$\frac{\sin 5\alpha}{\cos 3\alpha} + \tan 7\alpha \cdot \tan \alpha$$

$$= \frac{\sin 5\alpha}{\sin 5\alpha} + \tan 7\alpha \cdot \cot 7\alpha$$

$$= 1 + 1 = 2$$

CEVAP: E

CEVAP: C



1. $0 < x < \frac{\pi}{2} \Rightarrow \cos\left(\frac{3\pi}{2} - x\right) = -\sin x$

a) $\sin(\pi + x) = -\sin x$

b) $\cos(\pi - x) = -\cos x$

c) $\cos\left(\frac{\pi}{2} - x\right) = \sin x$

d) $\sin\left(\frac{\pi}{2} + x\right) = \cos x$

e) $\sin(2\pi + x) = \sin x$

CEVAP: A

$$\begin{aligned} 2. \quad & \frac{\sin(73\pi - \theta) + \sin(72\pi + \theta)}{\sin\left(-\frac{13\pi}{2} + \theta\right) - \cos(-\theta)} \quad 73\pi = 36.2\pi + \pi \\ & \quad 72\pi = 36.2\pi + 0 \\ & = \frac{\sin(\pi - \theta) + \sin \theta}{\sin\left(\frac{3\pi}{2} + \theta\right) - \cos \theta} \quad -\frac{13\pi}{2} = -2\pi.4 + \frac{3\pi}{2} \\ & = \frac{\sin \theta + \sin \theta}{-\cos \theta - \cos \theta} = \frac{2 \sin \theta}{-2 \cos \theta} = -\tan \theta \end{aligned}$$

CEVAP: A

$$\begin{aligned} 3. \quad & a + b = \frac{3\pi}{2} \Rightarrow a = \frac{3\pi}{2} - b \\ & \cos(3a + 2b) + \sin(3b + 4a) \\ & = \cos\left(3\left(\frac{3\pi}{2} - b\right) + 2b\right) + \sin\left(3b + 4\left(\frac{3\pi}{2} - b\right)\right) \\ & = \cos\left(\frac{9\pi}{2} - 3b + 2b\right) + \sin(3b + 6\pi - 4b) \\ & = \cos\left(\frac{\pi}{2} - b\right) + \sin(-b) \\ & = \sin b - \sin b = 0 \end{aligned}$$

CEVAP: C

$$\begin{aligned} 4. \quad & \tan 7^\circ = x \quad \cot 7^\circ = \frac{1}{x} \\ & \frac{\cot 173^\circ + \tan 97^\circ}{\tan 187^\circ} = \frac{-\cot 7^\circ - \cot 7^\circ}{\tan 7^\circ} \\ & = \frac{-\frac{1}{x} - \frac{1}{x}}{\frac{2}{x}} = -\frac{2}{x^2} \end{aligned}$$

CEVAP: C

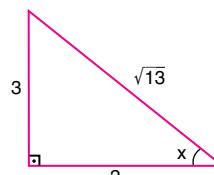
5. $\frac{\pi}{2} < x < \pi \rightarrow 2.$ bölge

$$\left(\frac{1}{4}\right)^{\sin x} = 8^{\cos x}$$

$$(2^{-2})^{\sin x} = (2^3)^{\cos x}$$

$$2^{-2\sin x} = 2^{3\cos x} \Rightarrow -\frac{2\sin x}{\cos x} = \frac{3\cos x}{\cos x}$$

$$\Rightarrow \tan x = -\frac{3}{2}$$



$$\begin{aligned} \sec x &= \frac{1}{\cos x} \\ &= \frac{1}{-\frac{2}{\sqrt{13}}} = -\frac{\sqrt{13}}{2} \end{aligned}$$

CEVAP: C

6. $0 < x < \frac{\pi}{4} \quad x = 30^\circ$ için

$$a = \cot x = \cot 30^\circ = \sqrt{3}$$

$$b = \sin x = \sin 30^\circ = \frac{1}{2}$$

$$c = \cos x = \cos 30^\circ = \frac{\sqrt{3}}{2}$$

$$b < c < a$$

CEVAP: C

$$\begin{aligned} 7. \quad & \sin \alpha = \frac{y}{z} \text{ ve } -1 \leq \sin \alpha \leq 1 \quad y < z \\ & \sec \alpha = \frac{x}{z} \Rightarrow \frac{1}{\cos \alpha} = \frac{x}{z} \\ & \Rightarrow \cos \alpha = \frac{z}{x} \text{ ve } -1 \leq \cos \alpha \leq 1 \\ & \Rightarrow z < x \\ & y < z < x \end{aligned}$$

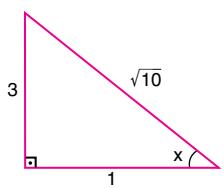
CEVAP: D

$$\begin{aligned} 8. \quad & \frac{\tan\left(\frac{3\pi}{16}\right) \cdot \tan\left(\frac{5\pi}{16}\right)}{\cos^2\left(\frac{5\pi}{16}\right) + \cos^2\left(\frac{3\pi}{16}\right)} \\ & = \frac{\tan\left(\frac{\pi}{2} - \frac{5\pi}{16}\right) \cdot \tan\left(\frac{5\pi}{16}\right)}{\cos^2\left(\frac{\pi}{2} - \frac{3\pi}{16}\right) + \cos^2\left(\frac{3\pi}{16}\right)} \\ & = \frac{\cot\left(\frac{5\pi}{16}\right) \cdot \tan\left(\frac{5\pi}{16}\right)}{\sin^2\left(\frac{3\pi}{16}\right) + \cos^2\left(\frac{3\pi}{16}\right)} = \frac{1}{1} = 1 \end{aligned}$$

CEVAP: E

9. $\alpha \in \left(0, \frac{\pi}{2}\right) \Rightarrow$ I. bölge

$$\cot \alpha = \frac{1}{3} \quad \sin \alpha \cos \alpha = \frac{3}{\sqrt{10}} \cdot \frac{1}{\sqrt{10}} = \frac{3}{10}$$

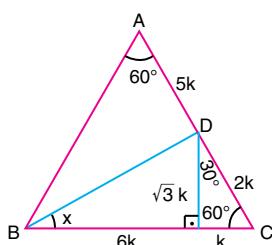


10. $\cos(A) = \frac{2}{5} \quad A + B + C = 180^\circ$

$$\begin{aligned} \cos(2A+B+C) &= \cos(A+A+B+C) \\ &= \cos(A+180^\circ) = -\cos A = -\frac{2}{5} \end{aligned}$$

CEVAP: C

11.



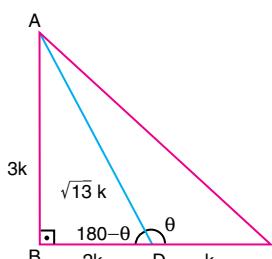
$$\frac{|AD|}{|DC|} = \frac{5}{2}$$

ABC eşkenar üçgen

$$\cot x = \frac{6K}{\sqrt{3}K} = 2\sqrt{3}$$

CEVAP: C

12.

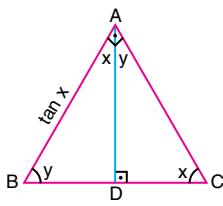


$$\sin(180 - \theta) = \frac{3K}{\sqrt{13}K} \Rightarrow \sin \theta = \frac{3}{\sqrt{13}}$$

$$\begin{aligned} |AB| &= |BC| \\ 3|DC| &= |AB| \\ |DC| &= k \\ |AB| &= 3k \end{aligned}$$

CEVAP: B

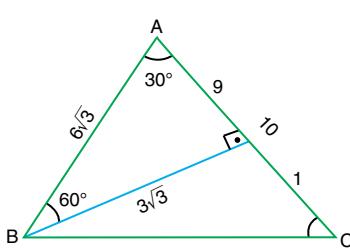
13.



$$\begin{aligned} \tan x &= \frac{|AD|}{|DC|} \\ |AD| &= \frac{|AD|}{|\tan x|} \\ |\tan x| &= \frac{|AD|}{|DC|} \\ |\tan x| &= \frac{\sin x}{\cos x} \\ |\tan x| &= \frac{\sin x}{\cos x} \\ \cos x &= \frac{|\tan x|}{|\sin x|} \\ \cos x &= \frac{|AD|}{|DC|} \end{aligned}$$

CEVAP: D

14.



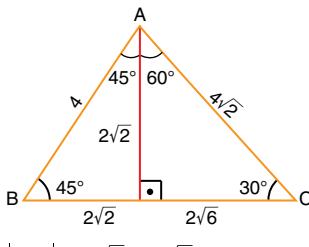
$$\tan C = \frac{3\sqrt{3}}{1} = 3\sqrt{3}$$

CEVAP: C

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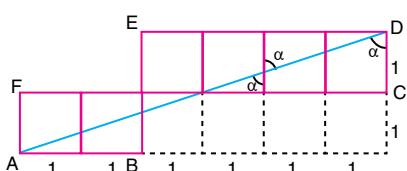
15.



$$|BC| = 2\sqrt{2} + 2\sqrt{6}$$

CEVAP: C

16.



$$\tan \alpha = \frac{6}{2} = 3$$

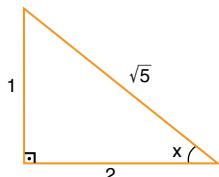
CEVAP: B



1. $0 < x < \frac{\pi}{2} \Rightarrow$ II. bölge

$$\cos^2 x - 4\sin^2 = 0 \Rightarrow \cos^2 x = 4\sin^2 x$$

$$\frac{\cos^2 x}{\sin^2 x} = 4 \Rightarrow \cot^2 x = 4 \Rightarrow \cot x = 2$$



$$\operatorname{cosec} x = \frac{1}{\sin x} = \frac{1}{\frac{1}{\sqrt{5}}} = \sqrt{5}$$

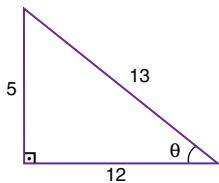
2. $0 < \theta < \frac{\pi}{2} \rightarrow$ I. bölge

$$\cot\left(\frac{\pi}{2} + \theta\right) = -\frac{5}{12} \Rightarrow \tan \theta = \frac{5}{12}$$

$$\sin(\pi + \theta) + \cos\left(\frac{3\pi}{2} - \theta\right)$$

$$= -\sin \theta - \sin \theta$$

$$= -2\sin \theta = -\frac{10}{13}$$



3. $\tan(\pi + x) = \cot x$ yanlıştır.

$$\tan(\pi + x) = \tan x$$

4. $3x^2 - 2x + a = 0$

$$x_1 = \cos \alpha$$

$$x_2 = \sin \alpha$$

$$x_1 + x_2 = -\frac{b}{a} = \frac{2}{3} \quad x_1 x_2 = \frac{c}{a} = \frac{a}{3}$$

$$(\cos \alpha + \sin \alpha)^2 = \left(\frac{2}{3}\right)^2 \quad \cos \alpha \cdot \sin \alpha = \frac{a}{3}$$

$$\cos^2 \alpha + 2\cos \alpha \sin \alpha + \sin^2 \alpha = \frac{4}{9}$$

$$1 + \frac{2a}{3} = \frac{4}{9} \Rightarrow \frac{2a}{3} = -\frac{5}{9}$$

$$\Rightarrow a = -\frac{5}{6}$$

CEVAP: B

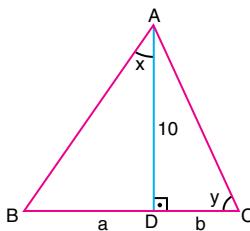
5. $\frac{\cos^3 x - \sin^3 x}{1 + \cos x \sin x}$

$$\frac{(\cos x - \sin x)(\cos^2 x + \cos x \sin x + \sin^2 x)}{1 + \cos x \sin x}$$

$$= \cos x - \sin x + \sin x = \cos x$$

CEVAP: A

6.



$$A(\widehat{ABC}) = \frac{10(a+b)}{2} = \frac{10.4}{2} = 20$$

$$\tan x + \cot y = \frac{2}{5}$$

$$\frac{a}{10} + \frac{b}{10} = \frac{2}{5}$$

$$a + b = 4$$

CEVAP: D

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CEVAP: A

CEVAP: C

7. $\frac{\cos(210^\circ) \cdot \sin(330^\circ)}{\sin(-45^\circ) \cdot (\cos 315^\circ)}$

$$= \frac{(-\cos 30^\circ) \cdot (-\sin 30^\circ)}{(-\sin 45^\circ) \cdot (\cos 45^\circ)}$$

$$= \frac{\left(-\frac{\sqrt{3}}{2}\right) \cdot \left(-\frac{1}{2}\right)}{\left(-\frac{\sqrt{2}}{2}\right) \cdot \left(\frac{\sqrt{2}}{2}\right)} = \frac{\frac{\sqrt{3}}{4}}{-\frac{2}{4}} = -\frac{\sqrt{3}}{2}$$

CEVAP: B

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8. $\tan 15^\circ = m \quad \cot 15^\circ = \frac{1}{m}$

$$\frac{1 - \tan 75^\circ \cdot \tan 255^\circ}{1 - \tan 165^\circ \cdot \tan 345^\circ} = \frac{1 - \cot 15^\circ \cdot \cot 15^\circ}{1 - (-\tan 15^\circ) \cdot (-\tan 15^\circ)}$$

$$= \frac{1 - \frac{1}{m} \cdot \frac{1}{m}}{1 - m \cdot m} = \frac{m^2 - 1}{m^2} \cdot \frac{1}{1 - m^2} = -\frac{1}{m^2}$$

CEVAP: E

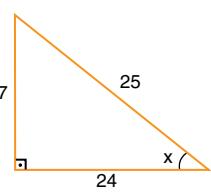
CEVAP: B

9. $\arccos\left(\frac{1}{2}\right) + \arcsin\left(\frac{\sqrt{3}}{2}\right)$
 $= \frac{\pi}{3} + \frac{\pi}{3} = \frac{2\pi}{3}$

CEVAP: A

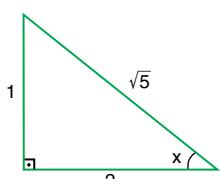
10. $\arctan(\sqrt{3}) + \text{arc cot}(-\sqrt{3})$
 $= \frac{\pi}{3} + \frac{5\pi}{6} = \frac{2\pi + 5\pi}{6} = \frac{7\pi}{6}$
 $(2) \quad (1)$

CEVAP: A

11. 
 $\arcsin\frac{7}{25} = x$
 $\sin x = \frac{7}{25}$
 $\tan\left(\arcsin\frac{7}{25}\right) = \tan x = \frac{7}{24}$

CEVAP: D

12. $\cos\left(\frac{\pi}{2} + \arctan\frac{1}{2}\right) = \cos\left(\frac{\pi}{2} + x\right) = -\sin x = -\frac{1}{\sqrt{5}} = -\frac{\sqrt{5}}{5}$
 $\arctan\frac{1}{2} = x$
 $\tan x = \frac{1}{2}$

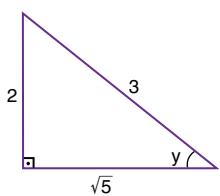


CEVAP: B

13. $\cot\left(\arcsin\frac{2}{3}\right) = x$

$$\arcsin\frac{2}{3} = y \quad \cot(y) = x$$

$$\sin y = \frac{2}{3} \quad \frac{\sqrt{5}}{2} = x$$



CEVAP: A

14. $a = \arccos\left(-\frac{1}{2}\right) = \pi - \frac{\pi}{3} = \frac{2\pi}{3}$

$$b = \arctan(1) = \frac{\pi}{4}$$

$$c = \arccos\left(\frac{\sqrt{2}}{2}\right) = \frac{\pi}{4}$$

$$\cot(a + b + c) = \cot\left(\frac{2\pi}{3} + \frac{\pi}{4} + \frac{\pi}{4}\right)$$

$$= \cot\left(\frac{2\pi}{3} + \frac{\pi}{2}\right) = \cot\left(\frac{7\pi}{6}\right)$$

$$= \cot\left(\frac{\pi}{6}\right) = \sqrt{3}$$

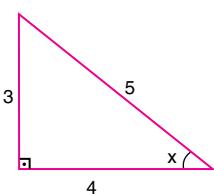
CEVAP: B

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15. $\sin\left(\arccos\left(-\frac{4}{5}\right)\right) = \sin x = \frac{3}{5}$

$$\arccos\left(\frac{4}{5}\right) = x$$

$$\cos x = \frac{4}{5}$$



CEVAP: D

16. $f(x) = \arccos\left(\frac{x}{2} + 3\right)$

$$y = \arccos\left(\frac{x}{2} + 3\right)$$

$$\cos y = \frac{x}{2} + 3$$

$$\cos y - 3 = \frac{x}{2}$$

$$2\cos y - 6 = x \Rightarrow f^{-1}(x) = 2\cos x - 6$$

CEVAP: A



Trigonometri

Cözüm 5

1. $f(x) = 3\sin(2x + 1)$

$$\text{Esas periyot} = \frac{2\pi}{2} = \pi$$

CEVAP: D

2. $f(x) = 2\cos^2(3x-1) + 4$

$$\text{Esas periyot} = \frac{\pi}{3}$$

CEVAP: A

3. $f(x) = \tan^3(1 - 4x)$

$$\text{Esas periyot} = \frac{\pi}{|-4|} = \frac{\pi}{4}$$

CEVAP: B

4. Esas periyot = $\frac{\pi}{2}$

$$f\left(\pi + \frac{\pi}{2}\right) = f\left(\pi - \frac{\pi}{2}\right) = f(\pi) = 3$$

$$f\left(\frac{3\pi}{2}\right) = f\left(\frac{\pi}{2}\right) = f(\pi) = 3$$

$$f\left(\frac{3\pi}{2}\right) + f\left(\frac{\pi}{2}\right) = 3 + 3 = 6$$

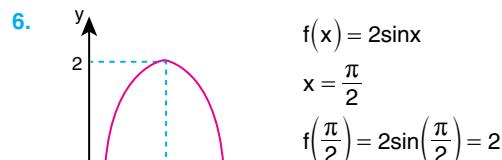
CEVAP: E

5. $f(x) = f(x + k)$ eşitliğini sağlayan k sayıları $f(x)$ fonksiyonunun esas periyodunun tam katıdır.

$f(x) = \cot\left(\frac{x-1}{3}\right)$ fonksiyonunun esas periyodu

$$\frac{\pi}{\frac{1}{3}} = 3\pi \text{ dir. } k \text{ sayısı } 3\pi \text{ nin tam katlarından } 12\pi \text{ olabilir.}$$

CEVAP: E



CEVAP: A

Trigonometri

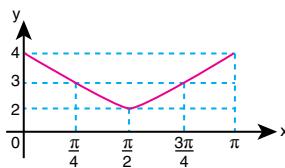
7. Fonksiyona bakıldığında $x = \pi$ için $y = 1$ olmaktadır.

- a) $y = \sin\left(\frac{3\pi}{2}\right) = -1$ b) $y = \cos\left(\frac{3\pi}{2}\right) = 0$
c) $y = \frac{1}{2}\sin\pi = 0$ d) $y = \sin\left(\frac{\pi}{2}\right) = 1$
e) $y = \cos\left(\frac{\pi}{2}\right) = 0$

CEVAP: D

9. $f(x) = 3 + \cos 2x$

x	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π
y	4	3	2	3	4



CEVAP: D

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8. Grafiğe bakıldığında

$$x = \frac{\pi}{2} \text{ için } y = 3$$

$$x = \pi \text{ için } y = \infty$$

$$f(x) = 3 \tan \frac{x}{2} \quad y = 3 \cdot \tan \frac{\pi}{4} = 3$$

$$y = 3 \tan \frac{\pi}{2} = \infty$$

CEVAP: A

10. Grafiğe bakıldığında $x = \pi$ için $y = -3$ olmalı

- a) $y = \sin x + 1 = \sin \pi + 1 = 1$
b) $y = 2 - \cos x = 2 - \cos \pi = 3$
c) $y = 2 - \sin x = 2 - \sin \pi = 2$
d) $y = 2 \sin x - 1 = 2 \sin \pi - 1 = -1$
e) $y = 2 \cos x - 1 = 2 \cos \pi - 1 = -3$

CEVAP: E



Trigonometri

Çözüm 6

1. $\sin 20^\circ \cos 40^\circ + \cos 20^\circ \sin 40^\circ$

$$= \sin 60^\circ = \frac{\sqrt{3}}{2}$$

CEVAP: C

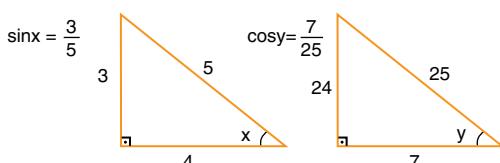
2. $\frac{1}{2} \cdot \sin 15^\circ - \frac{\sqrt{3}}{2} \cos 15^\circ$

$$= \cos 60^\circ \cdot \sin 15^\circ - \sin 60^\circ \cos 15^\circ$$

$$= \sin(15^\circ - 60^\circ) = \sin(-45^\circ) = -\frac{\sqrt{2}}{2}$$

CEVAP: E

3.



$$\cos(x-y) = \cos x \cos y + \sin x \sin y$$

$$= \frac{4}{5} \cdot \frac{7}{25} + \frac{3}{5} \cdot \frac{24}{25} = \frac{100}{125} = \frac{4}{5}$$

CEVAP: B

4. $\tan 75^\circ = \tan(45^\circ + 30^\circ)$

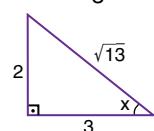
$$= \frac{\tan 45^\circ + \tan 30^\circ}{1 - \tan 45^\circ \cdot \tan 30^\circ}$$

$$= \frac{1 + \frac{1}{\sqrt{3}}}{1 - \frac{1}{\sqrt{3}}} = \frac{\sqrt{3} + 1}{\sqrt{3} - 1} = \frac{3 + 2\sqrt{3} + 1}{3 - 1} = 2 + \sqrt{3}$$

CEVAP: A

5. $\sin 40^\circ = m$ $\cos 80^\circ = 1 - 2\sin^2 40^\circ = 1 - 2m^2$

CEVAP: B



6. $\tan x = \frac{2}{3}$ $\sin 2x = 2 \sin x \cos x$

$$= 2 \cdot \frac{2}{\sqrt{13}} \cdot \frac{3}{\sqrt{13}}$$

$$= \frac{12}{13}$$

CEVAP: B

7. $\sin 15^\circ \cdot \sin 75^\circ = \frac{2 \sin 15^\circ \cos 15^\circ}{2}$

$$= \frac{\sin 30^\circ}{2} = \frac{1}{2} = \frac{1}{4}$$

CEVAP: A

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8. $x + y = \frac{\pi}{3}$

$$(\sin x + \sin y)^2 + (\cos x - \cos y)^2$$

$$= \sin^2 x + 2\sin x \sin y + \sin^2 y + \cos^2 x - 2\cos x \cos y + \cos^2 y$$

$$= 2 + 2(\sin x \sin y - \cos x \cos y)$$

$$= 2 + 2(-\cos(x+y)) = 2 + 2(-\cos \frac{\pi}{3})$$

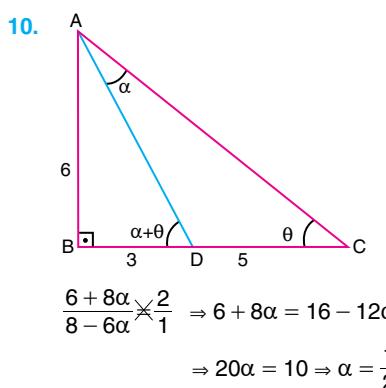
$$= 2 + 2 \left(-\frac{1}{2} \right) = 1$$

CEVAP: D

Trigonometri

9.
$$\begin{aligned} & \frac{2 \sin 10^\circ \cdot \cos 10^\circ \cdot \cos 20^\circ \cdot \cos 40^\circ}{2 \sin 10^\circ} \\ &= \frac{2 \cdot \sin 20^\circ \cdot \cos 20^\circ \cdot \cos 40^\circ}{2 \cdot 2 \sin 10^\circ} \\ &= \frac{2 \sin 40^\circ \cos 40^\circ}{2 \cdot 2 \cdot \sin 10^\circ} = \frac{\sin 80^\circ}{8 \cdot \cos 80^\circ} \\ &= \frac{1}{8} \tan 80^\circ \\ &= \frac{1}{8} \cot 10^\circ \end{aligned}$$

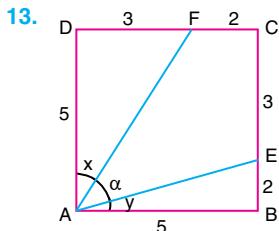
CEVAP: D



11.
$$\begin{aligned} (\sin x + \cos x)^2 &= \left(\frac{1}{3}\right)^2 \\ \sin^2 x + 2 \sin x \cos x + \cos^2 x &= \frac{1}{9} \\ 2 \sin x \cos x + 1 &= \frac{1}{9} \\ \sin 2x &= \frac{1}{9} - 1 \Rightarrow \sin 2x = -\frac{8}{9} \end{aligned}$$

12.
$$\begin{aligned} & \frac{\cos 36^\circ}{\cos 12^\circ} + \frac{\sin 36^\circ}{\sin 12^\circ} \\ &= \frac{(\sin 12^\circ)(\cos 36^\circ) + (\cos 12^\circ)(\sin 36^\circ)}{(\sin 12^\circ)(\cos 12^\circ)} \\ &= \frac{\cos 36^\circ \sin 12^\circ + \sin 36^\circ \cos 12^\circ}{\cos 12^\circ \sin 12^\circ} \\ &= \frac{\sin(36^\circ + 12^\circ)}{\frac{\sin 24}{2}} = \frac{2 \sin 48^\circ}{\sin 24} \\ &= \frac{2 \cdot 2 \sin 24^\circ \cos 24^\circ}{\sin 24^\circ} = 4 \cos 24^\circ \end{aligned}$$

CEVAP: C



$$\begin{aligned} \alpha + x + y &= 90^\circ \Rightarrow \alpha = 90^\circ - (x + y) \\ \cot \alpha &= \cot(90^\circ - (x + y)) = \tan(x + y) \end{aligned}$$

$$\begin{aligned} & \frac{\tan x \tan y}{1 - \tan x \tan y} = \frac{\frac{3}{5} + \frac{2}{5}}{1 - \frac{3}{5} \cdot \frac{2}{5}} \\ &= \frac{\frac{5}{5}}{1 - \frac{6}{25}} = \frac{1}{\frac{19}{25}} = \frac{25}{19} \end{aligned}$$

CEVAP: A

14.
$$\begin{aligned} \cos 58^\circ &= a = \sin 32^\circ \\ \sin 26^\circ &= \cos 64^\circ = 1 - 2 \sin^2 32^\circ \\ &= 1 - 2a^2 \end{aligned}$$

CEVAP: C

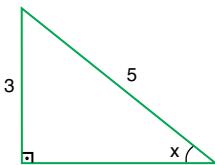
15.
$$\begin{aligned} \frac{\sqrt{3}}{\sin 20^\circ} - \frac{1}{\cos 20^\circ} &= \frac{\tan 60^\circ}{\sin 20^\circ} - \frac{1}{\cos 20^\circ} \\ &= \frac{\sin 60^\circ}{\cos 60^\circ \sin 20^\circ} - \frac{1}{\cos 20^\circ} \\ &= \frac{\sin 60^\circ \cos 20^\circ - \cos 60^\circ \sin 20^\circ}{\cos 60^\circ \sin 20^\circ \cos 20^\circ} \\ &= \frac{\sin 40^\circ}{\frac{1}{2} \cdot \frac{\sin 40^\circ}{2}} = 4 \end{aligned}$$

CEVAP: A

CEVAP: B

16.
$$4 \sin x - 3 \cos x = 0$$

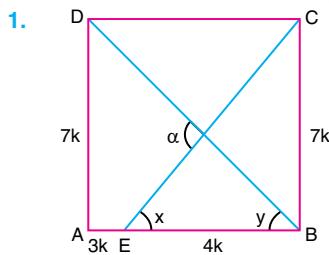
$$\frac{4 \sin}{\cos x} = \frac{3 \cos x}{\cos x} \Rightarrow \tan x = \frac{3}{4}$$



$$\begin{aligned} \cos 2x &= 2 \cos^2 x - 1 \\ &= 2 \cos^2 x - 1 \\ &= 2 \left(\frac{4}{5}\right)^2 - 1 \\ &= \frac{32}{25} - 1 \\ &= \frac{7}{25} \end{aligned}$$

CEVAP: B

CEVAP: B



$$\alpha = x + y \Rightarrow \tan \alpha = \tan(x + y)$$

$$\Rightarrow \tan \alpha = \frac{\tan x + \tan y}{1 - \tan x \cdot \tan y}$$

$$= \frac{\frac{7}{4} + 1}{1 - \frac{7}{4}} = \frac{11}{-3}$$

$$\begin{aligned}4|AE| &= 3|EB| \\|AE| &= 3k \\|EB| &= 4k\end{aligned}$$

2. $\sin 4x = \frac{3}{4}$

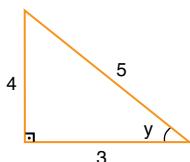
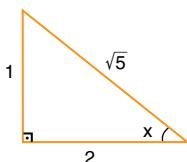
$$\begin{aligned}(\sin^2 2x + \cos^2 2x)^2 &= (1)^2 \\ \sin^4 2x + 2 \sin^2 2x \cos^2 2x + \cos^4 2x &= 1 \\ \sin^4 2x + \cos^4 2x + \frac{1}{2}(2 \sin 2x \cos 2x)^2 &= 1 \\ \sin^4 2x + \cos^4 2x + \frac{1}{2}(\sin 4x)^2 &= 1 \\ \sin^4 2 + \cos^4 2 + \frac{1}{2} \cdot \frac{9}{16} &= 1 \\ \sin^4 2x + \cos^4 2x &= \frac{23}{32}\end{aligned}$$

3. $\operatorname{arccot} 2 = x$

$$\operatorname{arccos} \frac{3}{5} = y$$

$$\cot x = 2$$

$$\cos y = \frac{3}{5}$$



$$\begin{aligned}\sin(\operatorname{arc cot} 2 + \operatorname{arccos} \frac{3}{5}) &= \sin(x + y) \\ &= \sin x \cos y + \sin y \cos x = \frac{1}{\sqrt{5}} \cdot \frac{3}{5} + \frac{4}{5} \cdot \frac{2}{\sqrt{5}} \\ &= \frac{11}{5\sqrt{5}} = \frac{11\sqrt{5}}{25}\end{aligned}$$

CEVAP: D

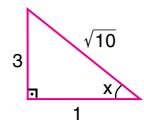
CEVAP: C

CEVAP: C

4. $\arctan 3 = x \quad \tan x = 3 \sqrt{-}$

$$\begin{aligned}\cos(2 \arctan 3) \\ = \cos(2x) = 2 \cos^2 x - 1\end{aligned}$$

$$\begin{aligned}= 2 \cdot \left(\frac{1}{\sqrt{10}}\right)^2 - 1 = \frac{2}{10} - 1 \\ = \frac{-8}{10} = \frac{-4}{5}\end{aligned}$$



CEVAP: E

5. $26x = \pi \Rightarrow 13x = \frac{\pi}{2}$

$$11x + 2x = 13x$$

$$\begin{aligned}\frac{\sin 12x}{\sin x} - \frac{\cos 12x}{\cos x} \\ (\cos x) \quad (\sin x)\end{aligned}$$

$$= \frac{\sin 12x \cdot \cos x - \cos 12x \cdot \sin x}{\cos x \cdot \sin x}$$

$$= \frac{\sin 11x}{\sin 2x} = \frac{\cos 2x}{\sin 2x} = 2 \cot 2x$$

CEVAP: B

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6. $\tan x = a \quad \tan y = a + 2$

$$x + y = \frac{3\pi}{4} \Rightarrow \tan(x + y) = \tan \frac{3\pi}{4}$$

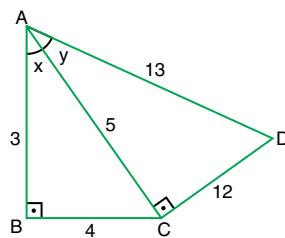
$$\frac{\tan x + \tan y}{1 - \tan x \tan y} = -1 \quad \frac{a + a + 2}{1 - a(a + 2)} = -1$$

$$2a + 2 = -1 + a^2 + 2a$$

$$a^2 = 3 \text{ ise } a = \sqrt{3} \text{ ve } a = -\sqrt{3} \text{ a değerleri çarpımı}$$

$$(\sqrt{3})(-\sqrt{3}) = -3$$

CEVAP: A



$$\begin{aligned}\tan(x + y) &= \frac{\tan x + \tan y}{1 - \tan x \tan y} \\ &= \frac{\frac{4}{3} + \frac{12}{5}}{1 - \frac{4}{3} \cdot \frac{12}{5}} \\ &= -\frac{56}{33}\end{aligned}$$

CEVAP: A

Trigonometri

8. $\sin\left(x + \frac{\pi}{4}\right) = 3 \cos\left(x + \frac{\pi}{4}\right)$

$$\frac{\sin\left(x + \frac{\pi}{4}\right)}{\cos\left(x + \frac{\pi}{4}\right)} = 3 \tan\left(x + \frac{\pi}{4}\right) = 3 \Rightarrow \frac{x+1}{1-x} = 3$$

$$\Rightarrow x+1 = 3 - 3x \Rightarrow 4x = 2 \Rightarrow x = \frac{1}{2}$$

$$\tan x = \frac{1}{2} \text{ ve } \cot x = 2$$

CEVAP: E

9. $\sin\frac{\pi}{8}\left(1 - 2\sin^2\frac{\pi}{16}\right)$

$$= \sin\frac{\pi}{8} \cdot \cos\left(2 \cdot \frac{\pi}{16}\right) = \sin\frac{\pi}{8} \cos\frac{\pi}{8}$$

$$= \frac{\sin\frac{\pi}{4}}{2} = \frac{\frac{\sqrt{2}}{2}}{2} = \frac{\sqrt{2}}{4}$$

CEVAP: C

10. $\cos 75^\circ + \cos 15^\circ = (\sin 15^\circ + \cos 15^\circ) = x^2$

$$\sin^2 15^\circ + 2\sin 15^\circ \cos 15^\circ + \cos^2 15^\circ = x^2$$

$$1 + \sin 30^\circ = x^2$$

$$1 + \frac{1}{2} = x^2$$

$$\frac{3}{2} = x^2$$

$$\frac{\sqrt{3}}{\sqrt{2}} = x$$

$$\frac{\sqrt{6}}{2} = x$$

CEVAP: A

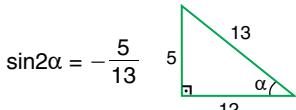
11. $\frac{\cos 105^\circ - \cos 15^\circ}{\sin 105^\circ + \sin 15^\circ} = \frac{-\sin 15^\circ - \cos 15^\circ}{\cos 15^\circ + \sin 15^\circ}$

$$= \frac{-(\sin 15^\circ + \cos 15^\circ)}{\cos 15^\circ + \sin 15^\circ} = -1$$

CEVAP: A

12. $(\sin \alpha + \cos \alpha)^2 = \left(\frac{2\sqrt{26}}{13}\right)^2$

$$\sin^2 \alpha + 2\sin \alpha \cos \alpha + \cos^2 \alpha = \frac{8}{13}$$



$$\sin 2\alpha = -\frac{5}{13}$$

$$\cos 2\alpha = \frac{12}{13}$$

$$1 - 2\sin^2 \alpha = \cos 2\alpha$$

$$1 - 2\sin^2 \alpha = \frac{12}{13}$$

$$-2\sin^2 \alpha = -\frac{1}{13}$$

$$\sin^2 \alpha = \frac{1}{26}$$

$$\sin \alpha = \frac{\sqrt{26}}{26}$$

CEVAP: C

13. $\sin 70^\circ = x \quad 1 + \cos 40^\circ = \cancel{x} + 2\cos^2 20^\circ \cancel{x} = 2x^2$

$$\cos 20^\circ = x$$

CEVAP: B

14. $\frac{1}{\sin 15^\circ} + \frac{1}{\cos 15^\circ} = \frac{\sin 15^\circ + \cos 15^\circ}{\sin 15^\circ \cdot \cos 15^\circ}$

$$= \frac{\frac{\sqrt{6}}{2}}{\frac{\sin 30^\circ}{2}} = \frac{\frac{\sqrt{6}}{2}}{\frac{1}{4}}$$

$$= \frac{\sqrt{6}}{2} \cdot \frac{4^2}{1} = 2\sqrt{6}$$

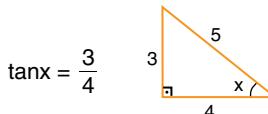
$$(\cos 15^\circ + \sin 15^\circ = \frac{16}{2} \text{ 10. sorudan})$$

CEVAP: A

15. $\frac{\sin x + \cos x}{\sin^2 x + \frac{1}{2}\sin 2x} = \frac{\sin x + \cos x}{\sin^2 x + \frac{1}{2} \cdot 2\sin x \cos x}$

$$= \frac{\sin x + \cos x}{\sin x(\sin x + \cos x)}$$

$$= \frac{1}{\sin x} = \text{cosec} x$$



$$\tan x = \frac{3}{4}$$

$$\frac{1}{\sin x} = \frac{1}{\frac{3}{5}} = \frac{5}{3}$$

CEVAP: D

16. $(1 - \cot \alpha)(1 - \tan \alpha)$

$$= 1 - \cot \alpha - \tan \alpha + \cot \alpha \tan \alpha$$

$$= 2 - \frac{\cos \alpha}{\sin \alpha} - \frac{\sin \alpha}{\cos \alpha}$$

$$= \frac{2 \sin \alpha \cos \alpha - \cos^2 \alpha - \sin^2 \alpha}{\sin \alpha \cos \alpha}$$

$$= \frac{\sin 2\alpha - 1}{\frac{\sin 2\alpha}{2}} = \frac{2 \left(\sin \frac{\pi}{4} - 1 \right)}{\sin \frac{\pi}{4}} = \frac{2 \left(\frac{\sqrt{2}}{2} - 1 \right)}{\frac{\sqrt{2}}{2}}$$

$$= \frac{2(\sqrt{2} - 2)}{2} \cdot \frac{\frac{2}{\sqrt{2}}}{\sqrt{2}} = 2 - 2\sqrt{2}$$

CEVAP: A



1. $\cos x = \frac{\sqrt{2}}{2}$

$$x = \frac{\pi}{4} + 2k\pi \quad \checkmark \quad x = -\frac{\pi}{4} + 2k\pi$$

CEVAP: C

2. $x \in [0, \pi]$ $\cos^2 x = \frac{3}{4}$
 $\cos x = \frac{\sqrt{3}}{2}$ $\cos x = -\frac{\sqrt{3}}{2}$
 $x_1 = 30^\circ$ $x_2 = 150^\circ$

iki farklı kökü vardır.

CEVAP: C

3. $0 \leq x \leq 2\pi$

$$\sqrt{3} \cos x + \sin x = 0 \Rightarrow \frac{\sqrt{3} \cos x}{\cos x} = \frac{-\sin x}{\cos x}$$

$$\tan x = -\sqrt{3}$$

$\tan x$ (-) olduğu yerler 2. ve 4. bölgedir. $\sqrt{3}$ olduğu açı $\frac{\pi}{3}$ dir.

$$x_1 = \pi - \frac{\pi}{3} = \frac{2\pi}{3} \quad x_2 = 2\pi - \frac{\pi}{3} = \frac{5\pi}{3}$$

$$\text{kökler toplamı} = \frac{2\pi}{3} + \frac{5\pi}{3} = \frac{7\pi}{3}$$

CEVAP: A

Y A R G I

Y A Y I N E V I

4.

$$2 \sin^2 x + \sin x - 3 = 0$$

$$2 \sin x \rightarrow +3$$

$$\sin x \rightarrow -1$$

$$2 \sin x + 3 = 0$$

$$\sin x = \frac{-3}{2}$$

$$-1 \leq \sin x \leq 1$$

olduğu için kök yok.

$$\sin x - 1 = 0$$

$$\sin x = 1$$

$$x = \frac{\pi}{2} + 2k\pi$$

$$k = 0 \text{ için } x = \frac{\pi}{2}$$

CEVAP: D

5. $\sin 2x + \sin x = 0$ ve $x \in [0, 2\pi]$

$$2\sin x \cos x + \sin x = 0$$

$$\sin x(2\cos x + 1) = 0$$

$$\sin x = 0 \quad 2\cos x + 1 = 0 \quad \cos x = -\frac{1}{2}$$

$$x_1 = 0 \quad x_2 = \pi \quad x_3 = 2\pi \quad x_4 = \frac{2\pi}{3} \quad x_5 = \frac{4\pi}{3}$$

CEVAP: D

7. $\sin\left(\frac{\pi}{4} + x\right) = 1$

$$\frac{\pi}{4} + x = \frac{\pi}{2} + 2k\pi \Rightarrow x = \frac{\pi}{4} + 2k\pi$$

$$k = 0 \quad x = \frac{\pi}{4}$$

CEVAP: C

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6. $0 < x < \pi$

$$3\cos^2 x - \sin^2 x = 0$$

$$\frac{3\cos^2 x}{\cos^2 x} = \frac{\sin^2 x}{\cos^2 x} \Rightarrow \sqrt{\tan^2 x} = \sqrt{3}$$

$$\tan x = \sqrt{3} \quad \text{ve} \quad \tan x = -\sqrt{3}$$

$$x_1 = \frac{\pi}{3} \quad \text{ve} \quad x_2 = \frac{2\pi}{3}$$

$$x \text{ değerleri toplamı} = \frac{\pi}{3} + \frac{2\pi}{3} = \pi$$

CEVAP: D

8. $\sin 5x = \cos 4x$

$$\sin 5x = \sin\left(\frac{\pi}{2} - 4x\right)$$

$$5x = \frac{\pi}{2} - 4x$$

$$9x = \frac{\pi}{2}$$

$$x = \frac{\pi}{18} = \frac{180^\circ}{18} = 10^\circ$$

CEVAP: E

9. $\cos^2 x - \frac{3}{2} \sin 2x + 2 \sin^2 x = 0$
 $\cos^2 x - \frac{3}{2} 2 \sin x \cos x + 2 \sin^2 x = 0$
 $\cos^2 x - 3 \sin x \cos x + 2 \sin^2 x = 0$
 $\cos x \rightarrow -2 \sin x$
 $\cos x \rightarrow -\sin x$
 $\cos x - \sin x = 0$
 $\cos x = \sin x$
 $\cos x = 2 \sin x$
 $\cot x = 1$
 $\cot x = 2$
 $x = \frac{\pi}{4}$

CEVAP: C

11. $0 \leq x \leq \pi$
 $2 \sin 2x \cdot \cos x = \cos x$
 $\cos x = 0 \quad 2 \sin 2x = 1 \Rightarrow \sin 2x = \frac{1}{2}$
 $x_1 = \frac{\pi}{2} \quad 2x = \frac{\pi}{6} \Rightarrow x_2 = \frac{\pi}{12}$
 $2x = \frac{5\pi}{6} \Rightarrow x_3 = \frac{5\pi}{12}$

3 farklı kök vardır.

CEVAP: C

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10. $\cos + \sqrt{3} \sin x = \sqrt{2} \quad x \in [0, 2\pi]$

$$\cos x + \tan 60^\circ \sin x = \sqrt{2}$$

$$\cos x + \frac{\sin 60^\circ}{\cos 60^\circ} \sin x = \sqrt{2}$$

$$\frac{\cos x \cos 60^\circ + \sin 60^\circ \sin x}{\cos 60^\circ} = \sqrt{2}$$

$$\cos(x + 60^\circ) = \sqrt{2} \cdot \cos 60^\circ = \sqrt{2} \cdot \frac{1}{2} = \frac{\sqrt{2}}{2}$$

$\cos(+)$ olduğu yerler 1. ve 4. bölgedir. $\frac{\sqrt{2}}{2}$ olduğu

yer 45° dir.

$$x_1 + \frac{\pi}{3} = \frac{\pi}{4}$$

$$x_2 + \frac{\pi}{3} = \frac{7\pi}{4}$$

$$x_1 = \frac{\pi}{4} - \frac{\pi}{3}$$

$$x_2 = \frac{7\pi}{4} - \frac{\pi}{3}$$

$$x_1 = \frac{-\pi}{12} + 2\pi$$

$$x_2 = \frac{17\pi}{12}$$

$$x_1 = \frac{23\pi}{12}$$

$$\mathcal{Q.K} = \left\{ \frac{17\pi}{12}, \frac{23\pi}{12} \right\}$$

CEVAP: E

12. $\frac{\sqrt{2} \sin 13^\circ \cos 9^\circ + \sqrt{2} \sin 9^\circ \cos 13^\circ}{4 \cos 79^\circ \cdot \cos 11^\circ} = \sin \alpha$
 $\frac{\sqrt{2} (\sin 13^\circ \cos 9^\circ + \sin 9^\circ \cos 13^\circ)}{2 \cdot 2 \sin 11^\circ \cos 11^\circ} = \sin \alpha$
 $\frac{\sqrt{2} \cdot \sin 22^\circ}{2 \cdot \sin 22^\circ} = \sin \alpha \Rightarrow \sin \alpha = \frac{\sqrt{2}}{2}$

 $0 < \alpha < 90^\circ$

$$\alpha = \frac{\pi}{4}$$

CEVAP: B

13. $2 \cos x = \operatorname{cosec} x$
 $2 \cos x = \frac{1}{\sin x}$
 $2 \cos x \sin x = 1$
 $\sin 2x = 1$
 $2x = 90 + 2k\pi$
 $x = 45 + k\pi$
 $k = 0 \quad x = 45^\circ$
 $k = 1 \quad x = 225^\circ$
 $k = 2 \quad x = 305^\circ$
 $\vdots \quad \vdots$
x dar açısı 45° dir.

CEVAP: C

15. $0 \leq x \leq \pi$
 $\sin x \cdot \tan x = \cos x - 1$
 $\sin x \frac{\sin x}{\cos x} = \cos x - 1$
 $\sin^2 x = \cos^2 x - \cos x$

$$\sin^2 x - \cos^2 x = -\cos x \Rightarrow \cos 2x = \cos x$$

$$2x = x + 2k\pi \text{ ve } 2x = -x + 2k\pi$$

$$x = 2k\pi \quad \text{ve} \quad 3x = 2k\pi \Rightarrow x = \frac{2k\pi}{3}$$

$$k = 0 \Rightarrow x_1 = 0 \quad k = 1 \Rightarrow x_2 = 2\pi \quad x_3 = \frac{2\pi}{3}$$

$$x \text{ değerleri toplam} = 0 + \frac{2\pi}{3} = \frac{2\pi}{3}$$

CEVAP: B

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14. $\sec^2 x + \operatorname{cosec}^2 x = 4$

$$\frac{1}{\cos^2 x} + \frac{1}{\sin^2 x} = 4 \Rightarrow \frac{\sin^2 x + \cos^2 x}{\sin^2 x \cdot \cos^2 x} = 4$$

$$(1) = 4$$

$$4 \cos^2 x \sin^2 x = 1 \Rightarrow (2 \sin x \cos x)^2 = 1$$

$$(\sin 2x)^2 = 1 \Rightarrow \sin^2 2x = 1 \quad \sin 2x = \pm 1$$

$$2x = \frac{\pi}{2}$$

$$2x = \frac{3\pi}{2}$$

$$x = \frac{\pi}{4}$$

$$x = \frac{3\pi}{4}$$

CEVAP: C

16. $5 \cos^2 x - \sin 2x + 4 \sin^2 x = 4$

$$5 \cos^2 x - 2 \sin x \cos x + 4(1 - \cos^2 x) = 4$$

$$5 \cos^2 x - 2 \sin x \cos x + 4 - 4 \cos^2 x = 4$$

$$\cos^2 x - 2 \sin x \cos x = 0$$

$$\cos x (\cos x - 2 \sin x) = 0$$

$$\cos x = 0 \quad \cos x - 2 \sin x = 0 \Rightarrow \cos x = 2 \sin x$$

$$\cot x = 2$$

$$x_1 = \frac{\pi}{2} \quad x_2 = \frac{3\pi}{2} \quad x_3 = \alpha \quad x_4 = \theta$$

4 farklı kök vardır.

CEVAP: D



Logaritma

Cözüm 1

1. $f(x) = a^x$ üstel fonksiyon ise $a \in \mathbb{R}^+$

D seçenekinde $f(x) = (-2)^x$ $-2 < 0$ olduğundan üstel fonksiyon değildir.

CEVAP: D

2. $f(x) = 3^{x+1}$ $g(x) = e^{x+2}$

$$g(-2) = e^{-2+2} = e^0 = 1$$

$$\text{fog}(-2) = f(g(-2)) = f(1) = 3^{1+1} = 3^2 = 9$$

CEVAP: B

3. $f(x) = a^x$ üstel fonksiyonunda $a > 1$ ise $f(x)$ artandır.

$0 < a < 1$ ise $f(x)$ azalandır.

I. $f(x) = e^{x-2}$ f artandır.

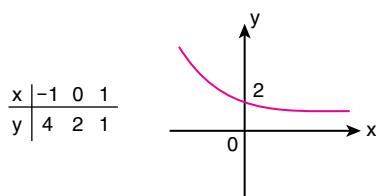
II. $h(x) = 5^{-x+3} = \left(\frac{1}{5}\right)^{x-3}$ h azalandır.

III. $g(x) = \left(\frac{3}{2}\right)^{x-1}$ g artandır.

I ve III artandır.

4. $f(x) = \left(\frac{1}{2}\right)^{x-1}$

f azalandır.



f azalandır.

CEVAP: C

5. $f(x) = 2^{x+3}$

$$y = 2^{x+3}$$

$$\log_2 y = x + 3 \Rightarrow \log_2 y - 3 = x$$

$$\Rightarrow f^{-1}(x) = \log_2 x - 3$$

CEVAP: A

6. $f(x) = \log_3(2x+3)$

$$y = \log_3(2x+3) \Rightarrow 3^y = 2x+3$$

$$\Rightarrow \frac{3^y - 3}{2} = x \Rightarrow f^{-1}(x) = \frac{3^x - 3}{2}$$

CEVAP: C

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7. $f(x) = \ln(x-3) + 2$

$$y = \ln(x-3) + 2 \Rightarrow y-2 = \ln(x-3)$$

$$\Rightarrow e^{y-2} = x-3 \Rightarrow e^{y-2} + 3 = x$$

$$\Rightarrow f^{-1}(x) = e^{x-2} + 3$$

CEVAP: D

Logaritma

9. $3^{x+2} = 7 \Rightarrow x+2 = \log_3 7$
 $\Rightarrow x = \log_3 7 - 2$

CEVAP: C

10. $\log_5(x-2) = 2$
 $x-2 = 5^2$
 $x = 27$

CEVAP: D

11. $\log_3(\log_2(x+3)) = 1$
 $\log_2(x+3) = 3^1$
 $x+3 = 2^3$
 $x = 5$

CEVAP: A

12. $\log_{\frac{1}{2}}(\log_{\sqrt{3}}(2a-1)) = -2$
 $\log_{\sqrt{3}}(2a-1) = \left(\frac{1}{2}\right)^{-2} = 4$
 $2a-1 = (\sqrt{3})^4$
 $2a-1 = 9 \Rightarrow 2a = 10 \Rightarrow a = 5$

CEVAP: D

13. $\log_5(\log_3(\ln x)) = 0$
 $\log_3(\ln x) = 5^0 = 1$
 $\ln x = 3^1 \Rightarrow x = e^3$

CEVAP: B

14. $\log_3(a+b) = 1 \Rightarrow a+b = 3$
 $\log_3(a-b) = 0 \Rightarrow a-b = 1$
 $+ \quad \quad \quad 2a = 4$
 $a = 2$

CEVAP: D

15. $\log_5(7 + 6 \log_3 x) = 2$
 $7 + 6 \log_3 x = 5^2$
 $\Rightarrow 6 \log_3 x = 18 \Rightarrow \log_3 x = 3 \Rightarrow x = 27$

CEVAP: D

16. $10^{3+\log x} = 4000$
 $10^3 \cdot 10^{\log x} = 4000 \Rightarrow 1000 \cdot x = 4000$
 $\Rightarrow x = 4$

CEVAP: A



Logaritma

Çözüm 2

1. $\log_8^{32} + \log_{27}^{81} = \log_2^{2^5} + \log_3^{3^4}$
 $= \frac{5}{3} \log_2^2 + \frac{4}{3} \log_3^3 = \frac{5}{3} + \frac{4}{3} = 3$

CEVAP: D

2. $\log_{0,04}^{\frac{1}{5}} + \log_{0,2}^{25}$
 $= \log_{\frac{4}{100}}^{\frac{1}{5}} + \log_{\frac{2}{10}}^{25} = \log_{\left(\frac{1}{5}\right)^2}^{\frac{1}{5}} + \log_{5^{-1}} 5^2$
 $= \frac{1}{2} \log_{\frac{1}{5}}^{\frac{1}{5}} + \frac{2}{-1} \log_5^5 = \frac{1}{2} - 2 = -\frac{3}{2}$

CEVAP: A

3. $\log 100 + \ln e^2 + \log_{43}^1$
 $= \log 10^2 + 2 \ln e + \log_{43}^1$
 $= 2 + 2 + 0 = 4$

CEVAP: B

4. $\frac{\log_{18}^3 + \log_{18}^6}{\log_7^{21} - \log_7^3} = \frac{\log_{18}^{18}}{\log_7^7} = 1$

CEVAP: D

5. $\log_7 \left(\log_5 \left(\log_3^{243} \right) \right)$
 $= \log_7 \left(\log_5 \left(\log_3^{3^5} \right) \right) = \log_7 \left(\log_5 \log_3^{3^{\frac{1}{2}}} \right)$
 $= \log_7 \left(\log_5^{\frac{1}{2}} \right) = \log_7^1 = 0$

CEVAP: B

6. $125^{\log_{25}^4} + \sqrt{3}^{\log_3^{49}}$
 $= 4^{\log_{25}^{125}} + 49^{\log_3^{\sqrt{3}}} = 4^{\log_5^{5^3}} + 49^{\log_3^{\frac{3}{2}}}$
 $= 4^{\frac{3}{2} \log_5 5} + 49^{\frac{1}{2} \log_3 3}$
 $= (2^2)^{\frac{3}{2}} + (7^2)^{\frac{1}{2}} = 2^3 + 7 = 15$

CEVAP: D

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7. $a^3 = b^2$ $\log_a^2 b^3 = \frac{3}{2} \log_a^b$
 $3 = \log_a^{b^2}$ $= \frac{3}{2} \cdot \frac{3}{2}$
 $3 = 2 \log_a^b$ $= \frac{9}{4}$
 $\frac{3}{2} = \log_a^b$

CEVAP: E

8. $\frac{1}{\log_7^2 10} + \frac{1}{\log_6^{210}} + \frac{1}{\log_5^{210}}$
 $= \log_{210}^7 + \log_{210}^6 + \log_{210}^5$
 $= \log_{210}^{7.6.5} = \log_{210}^{210} = 1$

CEVAP: B

Logaritma

$$9. \frac{1}{1 + \frac{1}{\log_2^3}} = \frac{1}{1 + \log_3^2} = \frac{1}{\log_3^3 + \log_3^2}$$

$$= \frac{1}{\log_3^6} = \log_6^3$$

CEVAP: E

$$10. \ln \sqrt[3]{e^2} + \log 100 - \log_8^{\sqrt{2}}$$

$$= \ln e^{\frac{2}{3}} + \log 10^2 - \log_{2^3}^{2^2}$$

$$= \frac{2}{3} \ln e + 2 \log 10 - \frac{1}{6} \log_2^2$$

$$= \frac{2}{3} + \frac{2}{1} - \frac{1}{6} = \frac{4+12-1}{6} = \frac{15}{6} = \frac{5}{2}$$

$$(2) \quad (6) \quad (1)$$

CEVAP: C

$$11. \sqrt{(\log 49)^2 + (\log \frac{1}{7})^2}$$

$$= \sqrt{(2 \log 7)^2 + (-\log 7)^2}$$

$$= \sqrt{4(\log 7)^2 + (\log 7)^2} = \sqrt{5(\log 7)^2}$$

$$= \sqrt{5} \cdot \log 7$$

CEVAP: A

$$12. \log_{(\frac{1}{6})}^{128} \cdot \log_{32}^{216} = \log_{6^{-1}} 2^7 \cdot \log_2 6^3$$

$$= \frac{7}{-1} \cdot \frac{3}{5} \log_6^2 \cdot \log_2^6 = \frac{-21}{5}$$

CEVAP: C

$$13. \frac{\log_3^4}{\log_3^8} + \frac{\log 25}{\log 5} = \log_8^4 + \log_5^{25}$$

$$= \log_3^{2^2} + \log_5^{5^2} = \frac{2}{3} \log_2^2 + \frac{2}{1} \log_5^5$$

$$= \frac{2}{3} + 2 = \frac{8}{3}$$

CEVAP: D

$$14. \log_{\frac{1}{3}} (\log_2 (\ln x)) = 0$$

$$\log_2 (\ln x) = \left(\frac{1}{3}\right)^0 = 1$$

$$\ln x = 2$$

$$x = e^2$$

CEVAP: B

$$15. \frac{1}{\log_x^{xyz}} + \frac{1}{\log_y^{xyz}} + \frac{1}{\log_z^{xyz}}$$

$$= \log_{xyz}^x + \log_{xyz}^y + \log_{xyz}^z$$

$$= \log_{xyz}^{xyz} = 1$$

CEVAP: B

$$16. \log_{ab}^{(b^a)} - \log_{ab}^{\left(\frac{1}{a^4}\right)}$$

$$= \log_{ab}^{b^4 \cdot a^4} = \log_{ab}^{(ab)^4}$$

$$= 4 \log_{ab}^{ab} = 4$$

CEVAP: E



Logaritma

Cözüm 3

1. $\log_{15}^3 = a \Rightarrow \log_3^{15} = \frac{1}{a}$
 $\Rightarrow \log_3^3 + \log_3^5 = \frac{1}{a} \Rightarrow 1 + \log_3^5 = \frac{1}{a}$
 $\Rightarrow \log_3^5 = \frac{1}{a} - 1$
 $\log_{15}^{25} = \frac{\log_3^{25}}{\log_3^{15}} = \frac{\log_3^{5^2}}{\log_3^3 + \log_3^5}$
 $= \frac{2 \cdot \frac{1-a}{a}}{1 + \frac{1-a}{a}} = \frac{2-2a}{a} \cdot \frac{a}{1}$
 $= 2-2a$

CEVAP: C

2. $\log\left(\frac{3}{4}\right) + \log\left(\frac{4}{5}\right) + \dots + \log\left(\frac{299}{300}\right)$
 $= \log\left(\cancel{\frac{3}{4}} \cdot \cancel{\frac{4}{5}} \cdot \dots \cdot \cancel{\frac{299}{300}}\right) = \log\left(\frac{3}{300}\right)$
 $= \log\left(\frac{1}{100}\right) = \log 10^{-2} = -2 \log 10 = -2$

CEVAP: A

3. $\log 6 = x \Rightarrow \log 2 + \log 3 = x$
 $\log 4 = y \Rightarrow \log 2^2 = y \Rightarrow 2 \log 2 = y$
 $\Rightarrow \log 2 = \frac{y}{2}$
 $\frac{y}{2} + \log 3 = x \Rightarrow \log 3 = x - \frac{y}{2} = \frac{2x-y}{2}$

CEVAP: A

4. $\log_9 26! = a$
 $\log_9^{27!} = \log_9^{27 \cdot 26!} = \log_9^{27} + \log_9^{26!}$
 $= \log_3^{2^3} + a = \frac{3}{2} \log_3^3 + a = \frac{3}{2} + a = \frac{3+2a}{2}$

CEVAP: B

5. $\log_2^3 = a \quad \log_3^5 = b$
 $\log_{12}^{15} = \frac{\log_3^{15}}{\log_3^{12}} = \frac{\log_3^3 + \log_3^5}{\log_3^4 + \log_3^3}$
 $= \frac{1+b}{\log_3^{2^2} + 1} = \frac{1+b}{2 \log_3^2 + 1} = \frac{1+b}{\frac{2}{a} + 1}$
 $= \frac{a+ab}{2+a}$

CEVAP: B

6. $\log(m+n) = \log m + \log n$
 $\Rightarrow \log(m+n) = \log(m \cdot n)$
 $\Rightarrow m+n = mn \Rightarrow m = mn-n$
 $m = (m-1) \cdot n \Rightarrow n = \frac{m}{m-1}$

CEVAP: D

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7. $6^{\log_x 5} + 5^{\log_x 6} = 72$
 $6^{\log_x 5} + 6^{\log_x 5} = 72$
 $2 \cdot 6^{\log_x 5} = 72 \Rightarrow 6^{\log_x 5} = 36$
 $\Rightarrow \log_x 5 = 2 \Rightarrow x^2 = 5 \Rightarrow x = \sqrt{5}$

CEVAP: D

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8. $\log_{\sqrt{3}}^9 + \log_{\sqrt[3]{4}}^2 + \log x^3 = 7$
 $\log_{3\frac{1}{2}}^{3^2} + \log_{2\frac{2}{3}}^{2^1} + 3 \log x = 7$
 $4 \log_3^3 + \frac{3}{2} \log_2^2 + 2 \log x = 7$
 $4 + \frac{3}{2} + 3 \log x = 7 \Rightarrow 3 \log x = \frac{3}{2}$
 $\log x = \frac{1}{2} \Rightarrow x = 10^{\frac{1}{2}} = \sqrt{10}$

CEVAP: C

Logaritma

$$9. \quad \ln(a.b) = 7 \Rightarrow \ln a + \ln b = 7$$

$$\ln\left(\frac{a}{b}\right) = -3 \Rightarrow \ln a - \ln b = -3$$

$$\begin{array}{r} + \\ 2\ln a = 4 \\ \hline \end{array}$$

$$\ln a = 2$$

$$a = e^2$$

CEVAP: C

$$10. \quad f(x) = \log_2 x \quad g(x) = \log_3 x$$

$$f(8) = \log_2 8 = \log_2 2^3 = 3 \log_2 2 = 3$$

$$g(f(8)) = g(3) = \log_3 3 = 1$$

CEVAP: D

$$13. \quad \log_{3\sqrt{7}}^{27} \cdot \log_{\sqrt{8}}^{49} \cdot \log_9 4$$

$$= \log_{7^{\frac{1}{3}}} 3^3 \cdot \log_{2^{\frac{3}{2}}} 7^2 \cdot \log_3 2^2$$

$$= \frac{3}{1} \cdot \frac{2}{3} \cdot \frac{2}{2} \cdot \log_7 3 \cdot \log_3 2 \cdot \log_2 7$$

$$= 9 \cdot \frac{4}{3} \cdot 1 \cdot 1 = 12$$

CEVAP: B

$$11. \quad \log_8 \left(\log_9 \sqrt{x+1} \right) = -\frac{2}{3}$$

$$\log_9 \sqrt{x+1} = 8^{-\frac{2}{3}} = (2^3)^{-\frac{2}{3}} = 2^{-2} = \frac{1}{4}$$

$$\sqrt{x+1} = 9^{\frac{1}{4}} = (3^2)^{\frac{1}{4}} = 3^{\frac{1}{2}} = \sqrt{3}$$

$$x+1 = 3 \Rightarrow x = 2$$

CEVAP: E

$$12. \quad \log_a b = \frac{2}{3} \quad \log_b c = 6$$

$$\log_b \frac{a^2 \cdot b}{\sqrt{c}} = \log_b a^2 + \log_b b - \log_b \sqrt{c}$$

$$= 2 \log_b a + 1 - \frac{1}{2} \log_b c = 2 \cdot \frac{3}{2} + 1 - \frac{1}{2} \cdot 6$$

$$= 3 + 1 - 3 = 1$$

CEVAP: C

$$14. \quad f(x) = \log_2^{(x-2)} \quad g(x) = x + 3$$

$$g^{-1}(x) = (x - 3)$$

$$\log^{-1}(a) = 4 \Rightarrow f(g^{-1}(a)) = 4$$

$$\Rightarrow f(a - 3) = 4 \Rightarrow \log_2^{(a-5)} = 4$$

$$\Rightarrow a - 5 = 2^4 \Rightarrow a = 21$$

CEVAP: D

$$15. \quad 5^{\frac{\log(\log x)}{\log 5}} = 3^{\frac{1}{\log_2 3}}$$

$$5^{\log_5(\log x)} = 3^{\log_3 2}$$

$$(\log x)^{\log_5 5} = 2^{\log_3 3}$$

$$\log x = 2 \Rightarrow x = 10^2 = 100$$

CEVAP: C



Logaritma

Cözüm 4

1. $\log a - \log 5 = 4$

$$\begin{aligned} -\log 2 - \log b &= 3 \\ \log a - \log 5 - \log 2 + \log b &= 1 \end{aligned}$$

$$\log(a.b) - \log(5.2) = 1$$

$$\log(a.b) - 1 = 1 \Rightarrow \log(a.b) = 2$$

$$\Rightarrow a.b = 10^2 = 100$$

2. $3^{5+\log_2 x} = 81$

$$3^{5+\log_2 x} = 3^4 \Rightarrow 5 + \log_2 x = 4$$

$$\Rightarrow \log_2 x = -1 \Rightarrow x = 2^{-1} = \frac{1}{2}$$

CEVAP: A

3. $\log_6(3 + \log_3(2x + 5)) = 1$

$$3 + \log_3(2x + 5) = 6$$

$$\log_3(2x + 5) = 3$$

$$2x + 5 = 3^3$$

$$\Rightarrow 2x + 5 = 27 \Rightarrow 2x = 22 \Rightarrow x = 11$$

CEVAP: D

4. $\sqrt{(\log_2 9)^2 - 2 \cdot \log_2 9 + 1}$

$$= \sqrt{(\log_2 3^2)^2 - 2 \cdot \log_2 3^{-2} + 1}$$

$$= \sqrt{(2 \log_2 3)^2 - 4 \cdot \log_2 3^{-2} + 1}$$

$$= \sqrt{4(\log_2 3)^2 + 4 \log_2 3 + 1} = \sqrt{(2 \cdot \log_2 3 + 1)^2}$$

$$= \log_2 3^2 + \log_2 2 = \log_2 18$$

CEVAP: A

5. $\log x = 18$

$$\log \sqrt[3]{x^2 \sqrt{x^3 \sqrt{x^2}}} = \log \sqrt[3]{x^6 \cdot x^9 \cdot x^2}$$

$$\begin{aligned} &= \log \sqrt[18]{x^{17}} = \log x^{\frac{17}{18}} = \frac{17}{18} \log x \\ &= \frac{17}{18} \cdot 18^1 = 17 \end{aligned}$$

CEVAP: E

6. $\frac{4}{\log_3 18} + \frac{6}{\log_{\sqrt{2}} 18} + \frac{6}{\log_{\sqrt[3]{3}} 18}$

$$= 4 \cdot \log_{18} 3 + 6 \cdot \log_{18} \sqrt{2} + 6 \cdot \log_{18} \sqrt[3]{3}$$

$$= \log_{18} 3^4 + \log_{18} (\sqrt{2})^6 + \log_{18} (\sqrt[3]{3})^6$$

$$= \log_{18} 3^4 + \log_{18} 2^3 + \log_{18} 3^2$$

$$= \log_{18} (3^4 \cdot 2^3 \cdot 3^2) = \log_{18} (3^6 \cdot 2^3) = \log_{18} 18^3 = 3$$

CEVAP: C

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7. $\log 5 = x \quad \log 3 = y$

$$\log(0,45) = \log\left(\frac{45}{100}\right) = \log 45 - \log 100$$

$$= \log 5 + \log 3^2 - \log 10^2$$

$$= x + 2y - 2$$

CEVAP: A

8. $\log_{(a-1)} 125 = 3$

$$(a-1)^3 = 125 = 5^3$$

$$a-1 = 5$$

$$a = 6$$

$$a \cdot b = 6 \cdot 3 = 18$$

$\log_3 (2b+3) = 2$

$$2b+3 = 3^2$$

$$2b = 6$$

$$b = 3$$

CEVAP: C

Logaritma

$$9. \quad (\log_2^{48} - \log_2^6) \cdot (\log_7^{28} - \log_7^4)$$

$$= \log_2^{\frac{48}{6}} \cdot \log_7^{\frac{28}{4}} = \log_2^8 \cdot \log_7^7$$

$$= \log_2^{2^3} = 3 \log_2^2 = 3$$

CEVAP: C

$$10. \quad \log_3^{9!} = a$$

$$\frac{\log_8^{(8!)}}{\log_8^3} = \log_3^{(8!)}$$

$$\log_3^{9 \cdot 8!} = a \Rightarrow \log_3^9 + \log_3^{8!} = a$$

$$\Rightarrow 2 + \log_3^{8!} = a \Rightarrow \log_3^{8!} = a - 2$$

CEVAP: E

$$11. \quad f^{-1}(x) = \log_2^{(3x-a)}$$

$$f(3) = 2 \Rightarrow f^{-1}(2) = 3$$

$$\Rightarrow \log_2^{(3 \cdot 2 - a)} = 3 \Rightarrow 6 - a = 2^3$$

$$\Rightarrow 6 - a = 8 \Rightarrow a = -2$$

CEVAP: B

$$12. \quad (\sqrt[3]{e})^{\ln 8} + (\sqrt{3})^{\log_9^{16}}$$

$$= \left(e^{\frac{1}{3}}\right)^{\ln 2^3} + \left(3^{\frac{1}{2}}\right)^{\log_3 2^4}$$

$$= \left(e^{\frac{1}{3}}\right)^{3 \ln 2} + \left(3^{\frac{1}{2}}\right)^{2 \log_3 2}$$

$$= e^{\ln 2} + 3^{\log_3 2} = 2 + 2 = 4$$

CEVAP: D

$$13. \quad f(x) = \log_5\left(\frac{x-1}{x}\right)$$

$$f(2) + f(3) + \dots + f(25)$$

$$= \log_5^{\frac{1}{2}} + \log_5^{\frac{2}{3}} + \dots + \log_5^{\frac{24}{25}}$$

$$= \log_5\left(\frac{1}{2} \cdot \frac{2}{3} \cdot \dots \cdot \frac{24}{25}\right) = \log_5^{\frac{1}{25}} = \log_5 5^{-2} = -2 \log_5 5 = -2$$

CEVAP: B

$$14. \quad \log_5^{(a+2b)} = \log_5^a + \log_5^b$$

$$\log_5^{(a+2b)} = \log_5^{(a \cdot b)}$$

$$a + 2b = a \cdot b \Rightarrow 2b = a \cdot b - a$$

$$2b = a(b-1) \Rightarrow a = \frac{2b}{b-1}$$

CEVAP: E

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CEVAP: B

$$15. \quad \text{Aritmetik ortalama} = \frac{\log_9^{27} + \log_9^{243}}{2}$$

$$= \frac{\log_{3^2}^{3^3} + \log_{3^2}^{3^5}}{2} = \frac{\frac{3}{2} + \frac{5}{2}}{2} = \frac{8}{4} = 2$$

CEVAP: B

CEVAP: B

CEVAP: D

$$16. \quad m^8 = 25 \Rightarrow 8 = \log_m^{25}$$

$$\Rightarrow 8 = \log_m^{5^2} \Rightarrow 8 = 2 \log_m^5$$

$$\Rightarrow 4 = \log_m^5$$

$$\log_{125}^m = \log_{5^3}^m = \frac{1}{3} \log_5^m = \frac{1}{3} \cdot \frac{1}{4} = \frac{1}{12}$$

CEVAP: B



Logaritma

Çözüm 5

1. $f(x) = \log_4^{(x-3)}$

$$x - 3 > 0 \Rightarrow x > 3 \Rightarrow (3, \infty)$$

CEVAP: C

2. $f(x) = \log_{(x-2)}^{(5-x)}$

$$x - 2 > 0 \quad 5 - x > 0 \quad x - 2 \neq 1$$

$$x > 2 \quad 5 > x \quad x \neq 3$$

$$T.K = (2, 5) - \{3\}$$

CEVAP: D

3. $f(x) = \log(x^2 - x - 20) + x^3 - 4x$

$$x^2 - x - 20 > 0$$

$$x^2 - x - 20 = 0$$

$$x - 5 = 0 \quad x = 5$$

$$x + 4 = 0 \quad x = -4$$

$$T.K = (-\infty, -4) \cup (5, \infty)$$

x tam sayılar toplamı

$$= \cancel{\dots} \cancel{-6}, -5 + \cancel{6} + \cancel{7} \cancel{+ \dots} = -5$$

x	-4	5
	+ ↗ ↗ +	

CEVAP: B

4. $f(x) = \frac{7}{2 - \log_5^{(x-2)}}$

$$x - 2 > 0$$

$$2 - \log_5^{(x-2)} \neq 0$$

$$2 \neq \log_5^{(x-2)}$$

$$5^2 \neq x - 2$$

$$27 \neq x$$

$$x > 2$$

$$T.K = (2, \infty) - \{27\}$$

CEVAP: D

5. $f(x) = \ln\left(\frac{4-x}{x+3}\right)$

$$\frac{4-x}{x+3} > 0$$

$$4 - x = 0 \Rightarrow x = 4$$

$$x + 3 = 0 \Rightarrow x = -3$$

x	-3	4
	↓	↑

$$T.K = (-3, 4)$$

x tam sayıları {-2, -1, 0, 1, 2, 3} 6 tanedir.

CEVAP: C

CEVAP: D

6. $\log_3^8 \cdot \log_4^{(x+3)} = 3$

$$\log_3^{2^3} \cdot \log_2^{2^{(x+3)}} = 3$$

$$\frac{3}{2} \cdot \log_3^2 \log_2^{(x+3)} = 3$$

$$\frac{3}{2} \cdot \log_3^{(x+3)} = 3 \Rightarrow \log_3^{(x+3)} = 2$$

$$x + 3 = 3^2 \Rightarrow x = 6$$

CEVAP: B

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7. $\log_5^{(x-2)} + \log_5^{(x+2)} = 1$

$$\log_5^{(x-2)(x+2)} = 1 \Rightarrow \log_5^{(x^2-4)} = 1$$

$$\Rightarrow x^2 - 4 = 5 \Rightarrow x^2 = 9 \Rightarrow x = 3 \text{ ve } x = -3$$

CEVAP: D

CEVAP: B

8. $\frac{1}{\log_3^x} + \frac{3}{\log_2^x} = 2$

$$\log_x^3 + 3 \cdot \log_x^2 = 2$$

$$\log_x^3 + \log_x^{2^3} \Rightarrow \log_x^{24} = 2$$

$$\Rightarrow x^2 = 24 \Rightarrow x = \sqrt{24} \Rightarrow x = 2\sqrt{6}$$

CEVAP: C

Logaritma

9. $9^{x-1} + 3^{x-1} \cdot 6 = 0$

$$3^{x-1} = a \text{ dersek } a^2 + a - 6 = 0$$

$$a \rightarrow +3 = 0$$

$$a \rightarrow -2 = 0$$

$$a = -3 \quad a = 2$$

~~$3^{x-1} = 3$~~

$$3^{x-1} = 2 \Rightarrow x-1 = \log_3^2$$

$$\Rightarrow x = \log_3^2 + 1$$

$$\Rightarrow x = \log_3^2 + \log_3^3$$

$$\Rightarrow x = \log_3^6$$

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CEVAP: C

10. $\log_9^{x^2} - \log_9^{(2x-5)} - \log_9^{(2x+5)} = -\frac{1}{2}$

$$\log_9^{\frac{x^2}{(2x-5)(2x+5)}} = -\frac{1}{2}$$

$$\frac{x^2}{4x^2 - 25} = 9^{-\frac{1}{2}} = (3^2)^{-\frac{1}{2}} = 3^{-1} = \frac{1}{3}$$

$$3x^2 = 4x^2 - 25 \Rightarrow x^2 = 25$$

$$\Rightarrow x = 5 \quad \cancel{x=5}$$

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CEVAP: A

11. $\log_{25}^{(a^2-2a+1)} = b$

$$a^2 - 2a + 1 = 25^b$$

$$(a-1)^2 = 5^{2 \cdot b} \Rightarrow a-1 = 5^b$$

$$\Rightarrow a = 5^b + 1$$

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12. $\log_2^x + \log_x^4 = 3$

$$\log_2^x + \log_x^{2^2} = 3 \Rightarrow \log_2^x + 2 \log_x^2 = 3$$

$$\log_2^x = a \Rightarrow a + \frac{2}{a} = 3$$

$$\Rightarrow a^2 - 3a + 2 = 0$$

$$a \rightarrow -2 = 0 \quad a = 2$$

$$\log_2^x = 2$$

$$\log_2^x = 1 \quad a = 1$$

$$\mathcal{C.K} = \{2, 4\}$$

$$x = 2^2 = 4$$

$$x = 2^1 = 2$$

CEVAP: D

13. $\sqrt{\log_3^a} = \log_3^{\sqrt{a}} = \log_3^{\frac{1}{a^2}}$

$$\left(\sqrt{\log_3^a}\right)^2 = \left(\frac{1}{2} \log_3^a\right)^2$$

$$\log_3^a = \frac{1}{4} \left(\log_3^a\right)^2$$

$$\log_3^a = 0 \quad \log_3^a = 4$$

$$a = 3^0 = 1 \quad a = 3^4 = 81$$

$$\text{çarpım} = 1 \cdot 81 = 81$$

CEVAP: D

14. $x^{\log_3^x} = 9 \cdot x \Rightarrow \log_3^x = \log_x^{(9 \cdot x)}$

$$\log_3^x = \log_x^9 + \log_x^x \Rightarrow \log_3^x = 2 \log_x^3 + 1$$

$$\log_3^x = a \text{ dersek } a = \frac{2}{a} + 1$$

$$a^2 - a - 2 = 0$$

$$a \rightarrow -2 = 0 \quad a = 2 \quad \log_3^x = 2 \Rightarrow x = 9$$

$$a \rightarrow +1 = 0 \quad a = -1 \quad \log_3^x = -1 \Rightarrow x = \frac{1}{3}$$

$$\text{çarpım} = 9 \cdot \frac{1}{3} = 3$$

CEVAP: D

15. $\log(a-5) = \log(70-10a) - 1$

$$\log(a-5) = \log(70-10a) - \log 10$$

$$\log(a-5) = \log\left(\frac{70-10a}{10}\right)$$

$$a-5 = 7-a \Rightarrow 2a = 12 \Rightarrow a = 6$$

CEVAP: D

16. $\log_5^{(12x-1)} - \log_5^{(2x+3)} = 1$

$$\log_5^{\left(\frac{12x-1}{2x+3}\right)} = 1 \Rightarrow \frac{12x-1}{2x+3} = 5$$

$$\Rightarrow 12x-1 = 10x+15 \Rightarrow 2x = 16 \Rightarrow x = 8$$

$$\log_8^x = \log_8^8 = 1$$

CEVAP: C

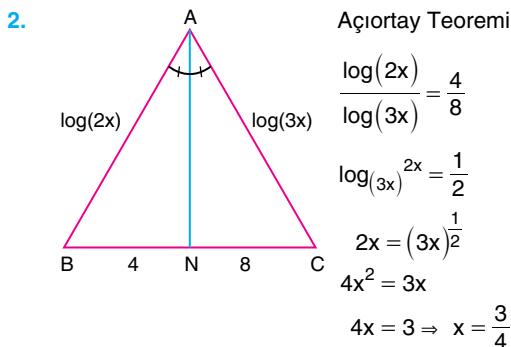


Logaritma

Cözüm 6

1. $x^2 - x \ln 15 + \ln 3 \cdot \ln 5 = 0$
 $x \rightarrow -\ln 3 = 0 \quad x_1 = \ln 3$
 $x \rightarrow \ln 5 = 0 \quad x_2 = \ln 5$
 $e^{x_1} + e^{x_2} = e^{\ln 3} + e^{\ln 5} = 3 + 5 = 8$

CEVAP: C



CEVAP: B

3. $(\log_4 x)^2 + \log_4 x^2 = -1$
 $(\log_4 x)^2 + 2 \log_4 x + 1 = 0$
 $(\log_4 x + 1)^2 = 0 \Rightarrow \log_4 x = -1$
 $\Rightarrow x = 4^{-1} = \frac{1}{4}$

CEVAP: A

4. $\frac{e^x - e^{-x}}{e^x + e^{-x}} = \frac{2}{3} \quad e^x = a \text{ dersek}$
 $e^{-x} = \frac{1}{a}$
 $\frac{a - \frac{1}{a}}{a + \frac{1}{a}} = \frac{2}{3} \Rightarrow \frac{a^2 - 1}{a^2 + 1} \cdot \frac{a}{a^2 + 1} = \frac{2}{3}$
 $\Rightarrow 3a^2 - 3 = 2a^2 + 2 \Rightarrow a^2 = 5$
 $\Rightarrow a = \sqrt{5} \quad a = -\sqrt{5}$
 $e^x = \sqrt{5} \quad e^x = -\sqrt{5}$
 $x = \ln \sqrt{5} \quad \text{kök yok}$

CEVAP: C

5. $x^2 - 4x + \log_3^{(5a+6)} = 0$
çakışık iki reel kökü varsa
 $\Delta = 0 \quad b^2 - 4ac = 0$
 $(-4)^2 - 4 \cdot 1 \log_3^{(5a+6)} \Rightarrow 5a + 6 = 3^4$
 $\Rightarrow 5a = 75 \Rightarrow a = 15$

CEVAP: A

6. $\log_4^{(x+2)} \leq 1$
 $0 < x + 2 \leq 4^1 \Rightarrow -2 < x \leq 2$
Ç.K = $(-2, 2]$

CEVAP: E

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7. $\log_{\frac{1}{2}}^{(x-1)} < -3$
 $0 < x - 1 < \left(\frac{1}{2}\right)^{-3} \Rightarrow 1 < x < 9 \Rightarrow \text{ÇK} = (1, 9)$

CEVAP: E

8. $0 \leq \log_7^{(x-2)} \leq 1$
 $7^0 \leq x - 2 \leq 7^1 \Rightarrow 3 \leq x \leq 9$
x tam sayılar $\{3, 4, 5, 6, 7, 8, 9\}$ 7 tanedir.

CEVAP: D

Logaritma

9. $-2 \leq \log_{\frac{1}{3}}(2x+1) < -1$

$$\left(\frac{1}{3}\right)^{-2} \geq 2x+1 > \left(\frac{1}{3}\right)^{-1}$$

$$9 \geq 2x+1 > 3 \Rightarrow 8 \geq 2x > 2$$

$$\Rightarrow 4 \geq x > 1$$

$$x \text{ tam sayıları } = 2 + 3 + 4 = 9$$

CEVAP: C

10. $\log_{\frac{1}{3}}\left(\log_5(x-3)\right) \geq 0$

$$0 < \log_5(x-3) \leq \left(\frac{1}{3}\right)^0 \Rightarrow 5^0 < x-3 \leq 5^1$$

$$\Rightarrow 4 < x \leq 8 \quad \text{ÇK} = (4, 8]$$

CEVAP: C

11. $\log_{25}^9 + \log_5^{(x+1)} < 2$

$$\log_{5^2}^3 + \log_5^{(x+1)} < 2$$

$$\log_5^3 + \log_5^{(x+1)} < 2 \Rightarrow \log_5^{3(x+1)} < 2$$

$$0 < 3x+3 < 5^2 \Rightarrow -3 < 3x < 22$$

$$\Rightarrow -1 < x < \frac{22}{3}$$

x tam sayıları {0, 1, 2, 3, 4, 5, 6, 7} 8 tane dir.

CEVAP: C

12. $\log_3^{(x+4)} + \log_3^{(x-4)} \leq \log_3^{41}$

$$\log_3^{(x+4)(x-4)} \leq \log_3^{41}$$

$$\Rightarrow \log_3^{(x^2-16)} \leq \log_3^{41}$$

$$\Rightarrow 0 < x^2 - 16 \leq 41 \Rightarrow 16 < x^2 \leq 57$$

x tam sayıları {5, 6, 7}

$$\text{toplam} = 5 + 6 + 7 = 18$$

CEVAP: D

13. $\log_3^{(4x+1)} - \log_3^{(x-2)} > 1$

$$\log_3^{(4x+1) \over (x-2)} > 1 \Rightarrow \frac{4x+1}{x-2} > 3$$

$$\Rightarrow 4x+1 > 3x-6 \Rightarrow x > -7$$

$$x-2 > 0 \Rightarrow x > 2$$

$$4x+1 > 0 \Rightarrow x > -\frac{1}{4}$$

$$\text{Ç.K} = (2, \infty)$$

CEVAP: C

14. $\log_3 x^{\log_3 x} \leq \log_3 3$

$$\log_3 x \cdot \log_3 x \leq 1$$

$$(\log_3 x)^2 \leq 1$$

$$-1 \leq \log_3 x \leq 1$$

$$3^{-1} \leq x \leq 3^1$$

$$\frac{1}{3} \leq x \leq 3$$

$$\left[\frac{1}{3}, 3\right]$$

CEVAP: E

15. $a = \log_2 7 \Rightarrow 2^a = 7 \Rightarrow 2 < a < 3$

$$b = \log_3 28 \Rightarrow 3^b = 28 \Rightarrow 3 < b < 4$$

$$c = \log_5 21 \Rightarrow 5^c = 21 \Rightarrow 1 < c < 2$$

$$c < a < b$$

CEVAP: A

16. $\log_{\frac{1}{3}}^x < \log_{\frac{1}{3}}^y \Rightarrow x > y$

I. $\ln x > \ln y \Rightarrow x > y$

II. $5^x > 5^y \Rightarrow x > y$

III. $\log_3^x < \log_3^y \Rightarrow x < y$

I ve II doğrudur.

CEVAP: C

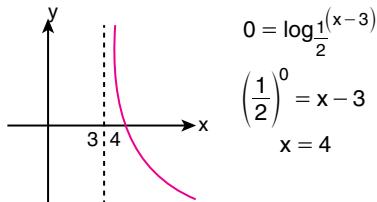


Logaritma

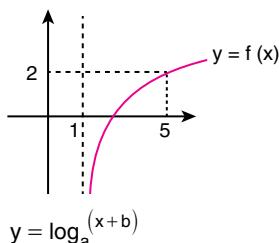
Cözüm 7

1. $f(x) = \log_{\frac{1}{2}}(x-3)$

$$x-3 > 0 \Rightarrow x > 3 \quad \frac{1}{2} < 1 \text{ olduğu için azalan } y = 0 \text{ için}$$



2.



$$x > 1 \quad x-1 > 0 \text{ ise } b = -1 \Rightarrow y = \log_a^{(x-1)}$$

$$x = 5 \text{ için } y = 2$$

$$2 = \log_a^{(5-1)} \Rightarrow a^2 = 4 \Rightarrow a = 2$$

$$a+b = 2-1 = 1$$

3. $25^x - 5^x - 6 = 0$

$$5^x = a \text{ dersek } a^2 - a - 6 = 0$$

$$a \rightarrow -3 = 0 \quad a = 3$$

$$a \rightarrow +2 = 0 \quad a = -2$$

$$5^x = 3 \quad 5^x = -2 \quad \text{Ç.K.} = \left\{ \log_5^3 \right\}$$

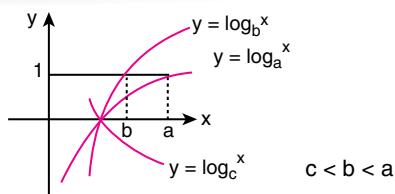
4. $\log_3^6 = a \Rightarrow \log_3^{3.2} = a$

$$\log_3^3 + \log_3^2 = a \Rightarrow \log_3^2 = a-1$$

$$\Rightarrow \log_2^3 = \frac{1}{a-1}$$

CEVAP: C

5.



CEVAP: A

6. $f(x) = \frac{e^{3x} - e^{-2x}}{93}$

$$f(\ln 2) = \frac{e^{3\ln 2} - e^{-2\ln 2}}{93}$$

$$= \frac{e^{\ln 2^3} - e^{\ln 2^{-2}}}{93} = \frac{8 - \frac{1}{4}}{93} = \frac{31}{93} = \frac{1}{12}$$

CEVAP: B

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CEVAP: A

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$$2 \leq \log_9^{36} + \log_3^{(x+2)} < 3$$

$$2 \leq \log_3^{6^2} + \log_3^{(x+2)} < 3$$

$$2 \leq \log_3^6 + \log_3^{(x+2)} < 3$$

$$2 \leq \log_3^{(6x+12)} < 3$$

$$3^2 \leq 6x+12 < 3^3 \Rightarrow -3 \leq 6x < 15$$

$\Rightarrow -\frac{1}{2} \leq x < \frac{5}{2}$ x tam sayıları $\{0, 1, 2\}$ 3 tanedir.

CEVAP: B

CEVAP: B

8. $f(x) = \log_4 \left(\log_5^{(3-x)} \right)$

$$\log_5^{(3-x)} > 0 \Rightarrow 3-x > 5^0$$

$$\Rightarrow 3-x > 1 \Rightarrow 2 > x$$

$$\mathcal{C.K.} = (-\infty, 2)$$

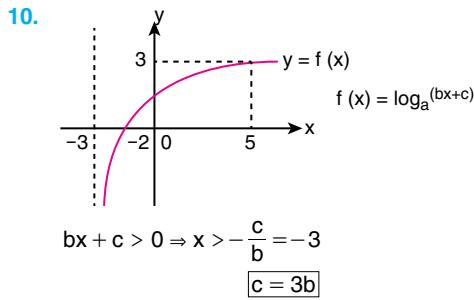
CEVAP: A

CEVAP: B

Logaritma

9. $\frac{5}{1+\log_5 7} + \frac{5}{1+\log_7 5} \quad \log_5 7 = a \Rightarrow \log_7 5 = \frac{1}{a}$
 $= \frac{5}{1+a} + \frac{5}{1+\frac{1}{a}} = \frac{5}{1+a} + \frac{5a}{a+1}$
 $= \frac{5+5a}{a+1} = \frac{5(1+a)}{1+a} = 5$

CEVAP: A



$x = -2$ için $y = 0$

$$0 = \log_a^{(-2b+c)} \quad [-2b+c=1]$$

$x = 5$ için $y = 3$

$$3 = \log_a^{(5b+c)} \quad [5b+c=a^3]$$

$$-2b+3b=1 \Rightarrow b=1 \Rightarrow c=3$$

$$5.1+3=a^3 \Rightarrow a^3=8 \Rightarrow a=2$$

$$a+b+c=2+3+1=6$$

11. $\ln(\log_2 x) = 1 + \ln 3$

$$\ln(\log_2 x) = \ln e + \ln 3$$

$$\ln(\log_2 x) = \ln(3e)$$

$$\log_2 x = 3e \Rightarrow x = 2^{3e} = 8^e$$

CEVAP: C

12. A) $\log_3 5 > 0$

B) $\ln 3 > 0$

C) $\log_{\frac{1}{3}} \frac{1}{2} = \log_{3^{-1}} 2^{-1} = \log_3 2 > 0$

D) $\log_{\left(\frac{7}{10}\right)} \left(\frac{3}{10}\right) > 0$

E) $\log_{\frac{1}{2}} \frac{3}{2} = \log_{2^{-1}} 3 = -\log_2 3 < 0$

CEVAP: E

CEVAP: E

13. $4^{\ln x} - 5 \cdot 2^{1+\ln x} + 16 = 0$
 $(2^2)^{\ln x} - 5 \cdot 2^1 \cdot 2^{\ln x} + 16 = 0$
 $2^{2\ln x} - 10 \cdot 2^{\ln x} + 16 = 0$
 $2^{\ln x} = a$ dersek

$$a^2 - 10a + 16 = 0$$
 $a \rightarrow -8 = 0 \Rightarrow a = 8$
 $a \rightarrow -2 = 0 \Rightarrow a = 2$
 $2^{\ln x} = 8 \quad 2^{\ln x} = 2$
 $\ln x = 3 \quad \ln x = 1$
 $x = e^3 \quad x = e$
 $x \text{ ler çarpımı} = e^3 \cdot e^1 = e^4$

CEVAP: C

14. $a^{\log_{\sqrt{a}}(x-3)} = b^{\log_b^{\frac{1}{2}}(x+3)^2}$
 $(x-3)^{\log_a^a} = (x+3)^{2\log_b^{\frac{1}{2}}}$
 $(x-3)^{\log_{a^2}^{\frac{1}{a}}} = (x+3)^{2\log_b^{-1}}$
 $(x-3)^2 = (x+3)^{-2}$
 $(x-3)^2 = \frac{1}{(x+3)^2}$
 $(x^2 - 9)^2 = 1$
 $x^2 - 9 = 1 \quad x^2 - 9 = -1$
 $x^2 = 10 \quad x^2 = 8$
 $x = \sqrt{10} \quad x = -\sqrt{10} \quad x = 2\sqrt{2} \quad x = -2\sqrt{2}$
 $x - 3 > 0 \Rightarrow x > 3$

CEVAP: A

15. $\log_3 \sqrt{27 \sqrt{9\sqrt{3}}} = \log_3 \frac{2.2.2\sqrt{27^4 \cdot 9^2 \cdot 3}}{8} = \log_3 \frac{8\sqrt{3^{12} \cdot 3^4 \cdot 3^1}}{8}$
 $= \log_3 \frac{8\sqrt{3^{17}}}{8} = \log_3^3 \frac{17}{8}$
 $= \frac{17}{8} \log_3 3 = \frac{17}{8}$

CEVAP: A

16. $a = e^{3\cos x} \quad b = e^{2\sin x} \quad \left(\frac{\ln a}{3}\right)^2 + \left(\frac{\ln b}{2}\right)^2 = 1$
 $\ln a = 3\cos x \quad \ln b = 2\sin x$
 $\frac{\ln a}{3} = \cos x \quad \frac{\ln b}{2} = \sin x$
 $\frac{\ln^2 a}{9} + \frac{\ln^2 b}{4} = 1$
 $(4) \quad (9)$
 $4\ln^2 a + 9\ln^2 b = 36$

CEVAP: B



1. $(a_n) = n^2 - 3n + 2$

$$\begin{aligned} \text{3. terim } \rightarrow a_3 &= 3^2 - 3 \cdot 3 + 2 \\ &= 9 - 9 + 2 \\ &= 2 \end{aligned}$$

CEVAP: A

2. $(a_n) = 5 + 10 + 15 + \dots + 5n$
 $= 5(1 + 2 + 3 + \dots + n)$
 $= \frac{5 \cdot n(n+1)}{2}$

$$\text{10. terim } \rightarrow a_{10} = 5 \cdot \frac{10 \cdot 11}{2} = 275$$

CEVAP: C

5. $(a_n) = (x+2)n^2 + (2z-1)n + 15$

$$\begin{aligned} (b_n) &= 7n^2 - 5n + 3y \\ (a_n) &= (b_n) \text{ ise} \end{aligned}$$

$$\begin{aligned} x+2 &= 7 & 2z-1 &= -5 & 3y &= 15 \\ x &= 5 & z &= -2 & y &= 5 \\ x+y+z &= 5+5-2=8 \end{aligned}$$

CEVAP: C

3. $(a_n) = \log_{(n+3)}(n^2 + 7)$

$$\begin{aligned} \text{5. terim } \rightarrow a_5 &= \log_8 32 = \log_2 32 = \frac{5}{3} \log_2 2 \\ &= \frac{5}{3} \end{aligned}$$

CEVAP: B

4. $(a_n) = \begin{cases} 5 & n \equiv 0 \pmod{3} \\ 2n-1 & n \equiv 1 \pmod{3} \\ n^2+3 & n \equiv 2 \pmod{3} \end{cases}$

$$a_5 = n^2 + 3 = 5^2 + 3 = 28$$

$$a_6 = 5 \quad a_7 = 2n - 1 = 14 - 1 = 13$$

$$a_5 - a_6 + a_7 = 28 - 5 + 13 = 36$$

CEVAP: D

6. $(a_n) = \frac{3n+2}{2n-1} \times \frac{26}{15}$

$$45n + 30 = 52n - 26$$

$$56 = 7n \Rightarrow n = 8 \Rightarrow 8. \text{ terim}$$

CEVAP: B

7. $(a_n) = \frac{2n+x}{3n+12}$ sabit dizi $\frac{2}{3} \times \frac{x}{12}$
 $3x = 24 \Rightarrow x = 8$

CEVAP: C

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8. a) $\frac{2n-1}{n-3} \Rightarrow n = 3$ için tanımsız
 b) $\log_{(n-1)}(2n+1) \Rightarrow n = 1$ için tanımsız
 c) $\tan n^\circ \Rightarrow n = 90$ için tanımsız
 d) $\sqrt[4]{3n-4} \Rightarrow n = 1$ için tanımsız
 e) $\sqrt[3]{2n-7} \Rightarrow$ her $n \in N^+$ için tanımlı

CEVAP: E

Diziler

9. $(a_n) = \begin{cases} 2^n + 1 & n \equiv 0 \pmod{2} \\ 2^n - 1 & n \equiv 1 \pmod{2} \end{cases}$

$$\frac{a_9 - a_7}{a_8 - 4a_6} = \frac{(2^9 - 1) - (2^7 - 1)}{(2^8 + 1) - 2^2(2^6 + 1)}$$

$$= \frac{2^9 - 1 - 2^7 + 1}{2^8 + 1 - 2^8 - 2^2} = \frac{2^7(2^2 - 1)^{-1}}{1 - 2^2}$$

$$= -128$$

10. $(a_n) = n^2 - 2n + 5 \quad (b_n) = n^2 - 5n + 2$

$a_4 = 16 - 8 + 5 = 13$

$b_4 = 16 - 20 + 2 = -2$

$(a_n \cdot b_n) \Rightarrow 4. \text{ terimi} \rightarrow (a_4 \cdot b_4)$
 $(13 \cdot -2) = -26$

CEVAP: E

11. $(a_n) = \frac{n+1}{n} \quad (b_n) = \frac{5n}{n+2}$

$5(a_n) - b_n = 5 \cdot \frac{(n+1)}{n} - \frac{5n}{(n+2)}$
 $= \frac{5(n^2 + 3n + 2) - 5n^2}{n^2 + 2n}$
 $= \frac{15n + 10}{n^2 + 2n}$

12. $(a_n) = \frac{2^{n+1}}{(n+3)!} \quad (b_n) = \frac{2^{n+2}}{(n+2)!}$

$$\left(\frac{a_n}{b_n}\right) = \frac{\frac{2^{n+1}}{(n+3)!}}{\frac{2^{n+2}}{(n+2)!}} = \frac{2^n \cdot 2^1}{(n+3)(n+2)!} \cdot \frac{(n+2)!}{2^n \cdot 2^2}$$
 $= \frac{1}{2n+6}$

CEVAP: D

13. $(a_n) = \begin{cases} 3n - 1 & n \geq 4 \\ 2n + 3 & n < 4 \\ 5 & n \leq 2 \end{cases}$

$(b_n) = \begin{cases} n^2 + 1 & 2 < n \end{cases}$

$a_3 = 2n + 3 = 9$

$b_3 = n^2 + 1 = 10$

$(a_n + b_n) \Rightarrow 3. \text{ terimi} \Rightarrow a_3 + b_3$
 $= 9 + 10 = 19$

CEVAP: D

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14. $(a_{n+2}) = (a_{n+1}) + (a_n) \quad a_7 = 13$

$n = 7 \text{ için} \quad a_9 = a_8 + a_7$

$n = 6 \text{ için} \quad \frac{+ a_8 = a_7 + a_6}{a_9 + a_8 = a_8 + 2a_7 + a_6}$
 $a_9 - a_6 = 2 \cdot 13 = 26$

CEVAP: E

15. $(a_n) = (3x - 2)n^2 + (6y - 1)n + x - 2y$

$\text{sabit dizi ise} \quad 3x - 2 = 0 \quad 6y - 1 = 0$

$x = \frac{2}{3} \quad y = \frac{1}{6}$

$(a_n) = \frac{2}{3} - 2 \cdot \frac{1}{6} = \frac{2}{3} - \frac{1}{3} = \frac{1}{3}$

$(a_{218}) = \frac{1}{3}$

CEVAP: B

16. $(a_n) = \frac{n+3}{3n-1}$

$a_1 \cdot a_2 \cdot a_3 \cdot a_4 = \frac{4^2}{2} \cdot \frac{5^1}{15} \cdot \frac{6^3}{48} \cdot \frac{7}{11} = \frac{21}{22}$

CEVAP: C



1. $(a_n) = \frac{7n-1}{n+1} = 7 - \frac{8}{n+1}$

$$\begin{array}{r} 7n-1 \\ -7n+7 \\ \hline -8 \end{array}$$

$n+1 = \{1, 2, 4, 8\}$

$n = \{0, 1, 3, 7\}$

3 terimi tam sayıdır.

2. $(a_n) = \frac{n^2-6n+11}{n+2} = n-8 + \frac{27}{n+2}$

$$\begin{array}{r} n^2-6n+11 \\ -n^2+2n \\ \hline -8n+11 \\ +8n+16 \\ \hline 27 \end{array}$$

$n+2 = \{1, 3, 9, 27\}$

$n = \{-1, 1, 7, 25\}$

3 terimi tam sayıdır.

3. $(a_n) = \frac{2n-9}{3n-7} < 0$

$2n-9=0 \Rightarrow n=\frac{9}{2}$

$3n-7=0 \Rightarrow n=\frac{7}{3}$

$$\begin{array}{r} \frac{7}{3} \quad \frac{9}{2} \\ \hline + \textcircled{-} \quad - \textcircled{+} \end{array}$$

$n = \{3, 4\}$ iki terim

4. $(a_n) = \frac{n^2+3n-28}{3-2n} \geq 0$

$n^2+3n-28=0$

$n \rightarrow +7=0 \quad n=-7$

$n \rightarrow -4=0 \quad n=4$

$3-2n=0 \Rightarrow n=\frac{3}{2}$

$$\begin{array}{r} -7 \quad \frac{3}{2} \quad 4 \\ \hline + \textcircled{-} \quad - \textcircled{+} \quad + \textcircled{-} \end{array}$$

$n = \{2, 3, 4\}$ üç terim

CEVAP: D

5. $(a_n) = \frac{n^2+6n-5}{3n+1} < 5$

$n^2+6n-5 < 15n+5$

$n^2-9n-10 < 0$

$n^2-9n-10=0$

$n \rightarrow -10=0 \quad n=10$

$n \rightarrow +1=0 \quad n=-1$

$$\begin{array}{r} -1 \quad 10 \\ \hline + \textcircled{-} \quad - \textcircled{+} \end{array}$$

$n = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ dokuz terim

CEVAP: C

6. $(a_n) = \frac{2}{n+3} \quad \frac{2}{17} < \frac{2}{n+3} < \frac{2}{5}$

$17 > n+3 > 5$

$14 > n > 2$

$n = \{3, 4, 5, \dots, 13\}$ 11 terim

CEVAP: D

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7. $(a_n) = n^2 - 8n + 7$

$n = \frac{-b}{2a} = \frac{-(-8)}{2 \cdot 1} = 4$

$a_4 = 4^2 - 8 \cdot 4 + 7 = 16 - 32 + 7 = -9$

CEVAP: E

8. $(a_n) = -n^2 + 9n + 3$

$n = \frac{-b}{2a} = \frac{-9}{2 \cdot (-1)} = \frac{9}{2} = 4,5$

$(a_5) = -5^2 + 5 \cdot 9 + 3 = -25 + 45 + 3 = 23$

CEVAP: E

Diziler

9. $(a_n) = \frac{2n-7}{3n+5}$

$$\frac{2n-7}{3n+5} = \frac{9}{29}$$

$$58n - 203 = 27n + 45$$

$$31n = 248$$

$n = 8$ bir sonraki $n = 9$

$$a_9 = \frac{2 \cdot 9 - 7}{3 \cdot 9 + 5} = \frac{11}{32}$$

10. $(a_{n+2}) = (a_{n+1}) + 3n \quad a_4 = 6$

$n = 3$ için

$$a_5 = a_4 + 9$$

$n = 4$ için

$$a_6 = a_5 + 12$$

$n = n - 2$ için

$$+ a_n = a_{n-1} + 3(n-2)$$

$$a_n = a_4 + 9 + 12 + \dots + 3(n-2)$$

$$a_n = 6 + 9 + 12 + \dots + 3(n-2)$$

$$a_n = 3(2 + 3 + 4 + \dots + (n-2))$$

$$a_n = 3\left(\frac{(n-2)(n-1)}{2} - 1\right)$$

$$= 3\left(\frac{n^2 - 3n + 2}{2}\right)$$

$$= \frac{3n^2 - 9n}{2}$$

CEVAP: B

Y R G I
Y A Y T
I N E V
E V I

11. $(a_{n+1}) = \left(\frac{n+1}{n+2}\right) \cdot (a_n) \quad a_1 = 3$

$n = 1$ için

$$a_2 = \frac{2}{3} \cdot a_1$$

$n = 2$ için

$$a_3 = \frac{3}{4} \cdot a_2$$

\vdots

$n = n - 1$ için

$$\times a_n = \frac{n}{n+1} \cdot a_{n-1}$$

$$a_n = a_1 \cdot \frac{2}{3} \cdot \frac{3}{4} \cdot \dots \cdot \frac{n}{n+1}$$

$$a_n = 3 \cdot \frac{2}{n+1} = \frac{6}{n+1}$$

CEVAP: A

12. $(a_n) = \frac{3^{n+1}}{(n+2)!}$

$$\frac{a_{n+2}}{a_{n+1}} = \frac{\frac{3^{n+3}}{(n+4)!}}{\frac{3^{n+2}}{(n+3)!}} = \frac{3^n \cdot 3^3}{(n+4)(n+3)!} \cdot \frac{(n+3)!}{3^n \cdot 3^2}$$

$$= \frac{3}{n+4}$$

CEVAP: E

CEVAP: A

13. $(a_n) = \frac{4}{n^2 + 9} \quad (b_n) = \frac{6}{2n^2 + 9}$

$$a_k = b_k$$

$$\frac{4}{k^2 + 9} \neq \frac{6}{2k^2 + 9}$$

$$8k^2 + 36 = 6k^2 + 54$$

$$2k^2 = 18$$

$$k^2 = 9$$

$$k = 3$$

CEVAP: C

14. 1 1 2 3 5 ...

Fibonacci dizisinde sonraki terim önceki iki terimin toplamıdır.

..., $2x + 3, 4x + 1, 7x - 1, \dots$

$$2x + 3 + 4x + 1 = 7x - 1$$

$$6x + 4 = 7x - 1$$

$$x = 5$$

CEVAP: A

15.

					1. Satır
		1		1	2. Satır
	1		2		3. Satır
1		3		3	4. Satır
1	4		6	4	5. Satır

$$1 + 4 + 6 + 4 + 1 = 16$$

CEVAP: B

16. 1, 1, 2, 3, 5, 8, 13 Fibonacci dizisi

$$1 + 1 + 2 + 3 + 5 + 8 + 13 = 33$$

CEVAP: C



Diziler

Çözüm 3

1. $a_n = a_1 + (n - 1)r \quad (5, 11, 17, \dots)$

$$a_1 = 5 \quad r = 11 - 5 = 6$$

$$a_n = 5 + (n - 1) \cdot 6 = 5 + 6n - 6 = 6n - 1$$

CEVAP: D

2. $a_6 = 42$
 $a_{17} = 75$
 $a_n = a_1 + (n - 1) \cdot r$

$$\begin{array}{r} -a_1 + 5r = 42 \\ + a_1 + 16r = 75 \\ \hline 11r = 33 \end{array}$$

$$r = 3$$

CEVAP: B

3. $2x + 11, \quad 3x + 7, \quad 5x + 6$ terimleri aritmetik dizi ise

$$3x + 7 = \frac{2x + 11 + 5x + 6}{2}$$

$$6x + 14 = 7x + 17$$

$$x = -3$$

CEVAP: B

4. Aritmetik dizide baştan ve sondan terimler toplamı eşittir.

$$14, \quad a, \quad b, \quad c, \quad d, \quad e, \quad 28$$

$$\begin{array}{c} 21 \\ 42 \\ 42 \\ \hline 42 \end{array}$$

$$\begin{aligned} a + b + c + d + e \\ = 42 + 42 + 21 \\ = 95 \end{aligned}$$

CEVAP: C

5. $a_n = a_1 + (n - 1)r$

$$a_{19} - a_5 = 56 \quad a_{23} = 103$$

$$(a_1 + 18r) - (a_1 + 4r) = 56 \quad a_1 + 22r = 103$$

$$a_1 + 18r - a_1 - 4r = 56 \quad a_1 + 88 = 103$$

$$14r = 56 \quad a_1 = 15$$

$$r = 4$$

CEVAP: A

6. $\log_{24} 64, \quad x, \quad \log_{24} 9$ terimleri aritmetik dizi ise

$$\begin{aligned} x &= \frac{\log_{24} 64 + \log_{24} 9}{2} = \frac{\log_{24} 64 \cdot 9}{2} \\ &= \frac{\log_{24} 8^2 \cdot 3^2}{2} = \frac{\log_{24} 24^2}{2} = \frac{2 \log_{24} 24^1}{2} = 1 \end{aligned}$$

CEVAP: A

7. $a_7 + a_{13} = 16$

$$\begin{array}{ccccccc} a_1 & + & a_2 & + & \cdots & + & a_{10} + \cdots + a_{18} + a_{19} \\ \swarrow & & & & & \searrow & \downarrow \\ & & & & 8 & & 16 \\ & & & & & \swarrow & \searrow \\ & & & & & 16 & \\ & & & & & & + \\ & & & & & & = 16 \cdot 9 + 8 = 152 \end{array}$$

CEVAP: B

CEVAP: B

8. $4 \dots \overbrace{76}^{7 \text{ terim}}$

$$a_1 = 4 \quad a_9 = 76$$

$$a_1 + 8r = 76$$

$$4 + 8r = 76$$

$$8r = 72$$

$$r = 9$$

$$4, 13, 22, 31$$

↓
yerleştirilen

2. terim

CEVAP: C

Diziler

9. $S_n = n^2 + 2n$

$n = 7$ için

$$a_1 + a_2 + \dots + a_6 + a_7 = 7^2 + 2 \cdot 7$$

$n = 6$ için

$$\underline{- a_1 + a_2 + \dots + a_6 = 6^2 + 2 \cdot 6}$$

$$a_7 = 63 - 48$$

$$a_7 = 15$$

CEVAP: A

10. $(-16, -13, -10, \dots)$ $a_1 = -16$

$$r = -13 - (-16) = 3$$

$$S_n = \frac{n}{2}(2a_1 + (n-1)r)$$

$$S_{10} = \frac{10}{2}(2(-16) + 9 \cdot 3) = 5(-32 + 27) \\ = -25$$

CEVAP: D

11. $5, 2x-2, y, \dots, 54, 8x+5$

$$5 + 8x + 5 = 2x - 2 + 54$$

$$8x + 10 = 2x + 52$$

$$6x = 42$$

$$x = 7$$

$$2x - 2 = \frac{y+5}{2}$$

$$12 = \frac{y+5}{2}$$

$$24 = y + 5$$

$$y = 19$$

12. $7, 17, 27, \dots$

$$a_1 = 7$$

$$r = 17 - 7 = 10$$

$$S_n = \frac{n}{2}(2a_1 + (n-1)r)$$

$$S_{20} = \frac{20}{2}(2 \cdot 7 + 19 \cdot 10) = 10(14 + 190) \\ = 2040$$

CEVAP: E

13. $a_6 = x$ $-2/a_1 + 5r = x$

$$a_{11} = y \quad + a_1 + 10r = y$$

$$- a_1 = -2x + y$$

$$a_1 = 2x - y$$

CEVAP: A

14. $a_7 = a_1 + 6r$ $a_7 + a_8 = 112$

$$a_8 = a_1 + 7r$$

$$a_3 + a_7 = 72$$

$$a_3 = a_1 + 2r$$

$$2a_1 + 13r = 112$$

$$- 2a_1 + 8r = 72$$

$$5r = 40$$

$$r = 8$$

$$2a_1 + 13 \cdot 8 = 112$$

$$2a_1 = 8$$

$$a_1 = 4$$

$$a_{11} = a_1 + 10r = 4 + 10 \cdot 8 = 84$$

CEVAP: D

Y
A
R
G
I

	1. hafta	2. hafta	3. hafta
	50	75	10

Y
A
R
G
I

$$a_1 = 50$$

Y
A
R
G
I

$$r = 75 - 50$$

$$a_7 = a_1 + 6r$$

Y
A
R
G
I

$$= 25$$

$$= 50 + 6 \cdot 25$$

Y
A
R
G
I

$$= 200$$

CEVAP: E

16. İlk on terim toplamı = S_{10}

İlk altı terim toplamı = S_6

$$S_{10} - S_6 = 192 \quad a_1 = 3$$

$$\frac{10}{2}(2a_1 + 9r) - \frac{6}{2}(2a_1 + 5r) = 192$$

$$5(6 + 9r) - 3(6 + 5r) = 192$$

$$30 + 45r - 18 - 15r = 192$$

$$12 + 30r = 192$$

$$30r = 180$$

$$r = 6$$

$$a_2 = a_1 + r = 3 + 6 = 9$$

CEVAP: B



Diziler

Çözüm 4

- 1.
- $6, 18, 54, \dots, a_1 = 6$

$$r = \frac{a_2}{a_1} = \frac{18}{6} = 3$$

$$a_n = a_1 \cdot r^{n-1} = 6 \cdot 3^{n-1} = 2 \cdot 3^n$$

- 2.
- $a_n = a_1 r^{n-1}$

$$a_7 = 125$$

$$a_3 = \frac{1}{5}$$

$$\frac{a_1 r^6}{a_1 r^2} = \frac{125}{\frac{1}{5}}$$

$$r^4 = 625 = 5^4$$

$$r = 5$$

- 3.
- $(9x - 3), (3x + 2), (x + 2)$
- geometrik dizinin ardışık terimleri ise

$$(3x + 2)^2 = (9x - 3)(x + 2)$$

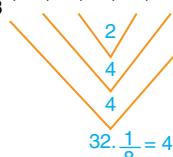
$$9x^2 + 12x + 4 = 9x^2 + 18x - 3x - 6$$

$$-3x = -10$$

$$x = \frac{10}{3}$$

4. Bir geometrik dizide baştan ve sondan terimler çarpımı eşittir.

$$\frac{1}{8}, a, b, c, d, e, 32$$



$$a \cdot b \cdot c \cdot d \cdot e = 4 \cdot 4 \cdot 2 \\ = 32$$

CEVAP: E

- 5.
- $\log_{3\sqrt{3}} 16, x, \log_8 9$

$$x^2 = \log_{3\sqrt{3}} 16 \cdot \log_8 9 = \log_{3\sqrt{3}} 2^4 \cdot \log_2 3^2$$

$$x^2 = \frac{4}{\frac{1}{3}} \cdot \frac{2}{3} \cdot \log_3 2 \cdot \log_2 3 = 8$$

$$x = 2\sqrt{2}$$

CEVAP: C

- 6.
- $\frac{3}{4}, \dots, \frac{1}{108}$

$$a_1 = \frac{3}{4} \quad a_5 = \frac{1}{108}$$

$$a_1 r^4 = \frac{1}{108}$$

$$\frac{3}{4} \cdot r^4 = \frac{1}{108}$$

$$r^4 = \frac{1}{81}$$

$$r = \frac{1}{3}$$

CEVAP: E

CEVAP: C

- 7.
- $\frac{3}{4}, \frac{3}{8}, \frac{3}{16}, \dots$

$$r = \frac{\frac{3}{8}}{\frac{3}{4}} = \frac{1}{2}$$

$$a_1 = \frac{3}{4}$$

$$S_n = a_1 \frac{1 - r^n}{1 - r}$$

$$S_{10} = \frac{3}{4} \cdot \frac{1 - \left(\frac{1}{2}\right)^{10}}{1 - \frac{1}{2}}$$

$$= \frac{3}{2^4} \cdot 2 \cdot \left(1 - \frac{1}{2^{10}}\right) = \frac{3}{2} - \frac{3}{2^{11}}$$

CEVAP: A

CEVAP: D

- 8.
- $a_n = a_1 r^{n-1}$

$$a_1 r^3 + a_1 r^7 = \frac{27}{4} \quad a_1 \cdot r + a_1 r^5 = 12$$

$$r^2 (a_1 r + a_1 r^5) = \frac{27}{4}$$

$$r^2 \cdot 12 = \frac{27}{4}$$

$$r^2 = \frac{9}{16}$$

$$r = \frac{3}{4}$$

CEVAP: D

CEVAP: D

9. $(a_n) = \frac{2}{3^{n+1}}$ $a_1 = \frac{2}{3^2} = \frac{2}{9}$
 $S_n = a_1 \cdot \frac{1-r^n}{1-r}$ $a_2 = \frac{2}{3^3} = \frac{2}{27}$
 $S_{10} = \frac{2}{9} \cdot \frac{1 - \left(\frac{1}{3}\right)^{10}}{1 - \frac{1}{3}}$ $r = \frac{a_2}{a_1} = \frac{\frac{2}{27}}{\frac{2}{9}} = \frac{1}{3}$
 $= \frac{2}{9} \cdot \frac{1 - \frac{1}{3^{10}}}{\frac{2}{3}} = \frac{1}{3} - \frac{1}{3^{11}}$

10. $S_n = a_1 \frac{1-r^n}{1-r}$
İlk 8 terim toplamı $S_8 = a_1 \frac{1-r^8}{1-r}$
İlk 4 terim toplamı $S_4 = a_1 \frac{1-r^4}{1-r}$
 $\frac{a_1 \cdot \frac{1-r^8}{1-r}}{a_1 \cdot \frac{1-r^4}{1-r}} = 65 \Rightarrow \frac{(1-r^4)(1+r^4)}{1-r^4} = 65$
 $r^4 = 64 \Rightarrow r = \sqrt[4]{64} = 2^{\frac{6}{4}} = 2^{\frac{3}{2}} = 2\sqrt{2}$

11. $a_5 \cdot a_8 = \sqrt[3]{4}$
 $a_1, a_2, \dots, a_{11}, a_{12}$
 \vdots
 $\sqrt[3]{4}$
 $= (\sqrt[3]{4})^6 = 4^2 = 16$

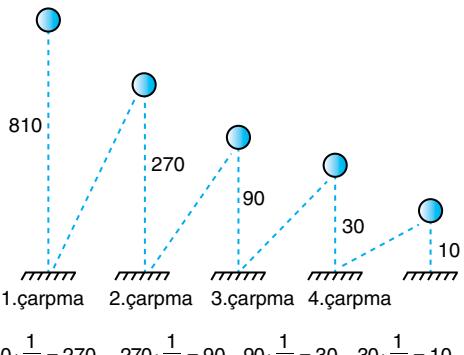
12. $S_n = 5^n - 1$
 $n = 4$ için $a_1 + a_2 + a_3 + a_4 = 5^4 - 1$
 $n = 3$ için $\underline{- a_1 + a_2 + a_3 = 5^3 - 1}$
 $\phantom{n=3 \text{ için }} a_4 = 5^4 - 5^3$
 $\phantom{n=3 \text{ için }} a_4 = 500$

CEVAP: B

13. $a_1 = 2^8$
 $r = \frac{1}{2\sqrt{2}}$
 $a_{15} = a_1 r^{14}$
 $= 2^8 \cdot \left(\frac{1}{2\sqrt{2}}\right)^{14}$
 $= 2^8 \cdot \frac{1}{2^{14} \cdot 2^7} = \frac{2}{2^{14}}$
 $= 2^{-13}$

CEVAP: C

14.



CEVAP: D

CEVAP: B

Y
A
R
G

15. 1. saatin sonunda $x \cdot 3^{n-2} = 9$

$$x \cdot 3^{-1} = 9 \Rightarrow x = 27$$

$$\begin{aligned} 10. \text{ saatin sonunda } & 27 \cdot 3^{10-2} = 3^3 \cdot 3^8 \\ & = 3^{11} \end{aligned}$$

CEVAP: C

16. $x + y, 2xy, xy^2$

hem aritmetik hem geometrik dizi ise terimler eşittir.

$$x + y = 2xy = xy^2$$

$$2xy = xy^2 \quad 2 = y$$

$$x + y = 2xy$$

$$x + 2 = 4x$$

$$2 = 3x$$

$$\frac{2}{3} = x$$

CEVAP: E

CEVAP: B



Diziler

Çözüm 5

1. $a_2 = 2, a_1 = 3, a_{n+2} = a_{n+1} \cdot a_n - (a_{n+1} + a_n)$
 $n = 1$ için $a_3 = a_2 \cdot a_1 - (a_2 + a_1) \Rightarrow a_3 = 2 \cdot 3 - (2+3) = 1$
 $n = 2$ için $a_4 = a_3 \cdot a_2 - (a_3 + a_2) \Rightarrow a_4 = 1 \cdot 2 - (1+2) = -1$
 $n = 3$ için $a_5 = a_4 \cdot a_3 - (a_4 + a_3) \Rightarrow a_5 = -1 \cdot 1 - (-1+1) = -1$

CEVAP: C

2. $a_{n+1} = a_n + \frac{3n}{2}$
 $n = 2$ için $\cancel{a_3} = a_2 + \frac{3 \cdot 2}{2}$
 $n = 3$ için $\cancel{a_4} = \cancel{a_3} + \frac{3 \cdot 3}{2}$
 $n = 4$ için $\cancel{a_5} = \cancel{a_4} + \frac{3 \cdot 4}{2}$
 \vdots
 $n = 9$ için $\underline{+ a_{10}} = \cancel{a_9} + \frac{3 \cdot 9}{2}$
 $a_{10} = a_2 + \frac{3}{2} (2 + 3 + 4 + \dots + 9)$
 $a_{10} - a_2 = \frac{3}{2} \cdot 44 = 66$

CEVAP: D

3. $a_{n+1} = 2^n \cdot a_n$
 $n = 5$ için $\cancel{a_6} = 2^5 \cdot a_5$
 $n = 6$ için $\cancel{a_7} = 2^6 \cdot \cancel{a_6}$
 \vdots
 $n = 9$ için $\frac{x}{a_5} a_{10} = 2^9 \cdot \cancel{a_9}$
 $a_{10} = 2^5 \cdot 2^6 \dots 2^9 \cdot a_5$
 $\frac{a_{10}}{a_5} = 2^{5+6+\dots+9} = 2^{35}$

CEVAP: E

4. $a_n = \begin{cases} \frac{1}{n}, & n \text{ tek ise} \\ -\frac{1}{n-1}, & n \text{ çift ise} \end{cases}$
 $a_1 + a_2 + a_3 + a_4 + \dots + a_{15}$
 $= \frac{1}{1} - \frac{1}{1} + \frac{1}{3} - \frac{1}{3} + \dots + \frac{1}{13} - \frac{1}{13} + \frac{1}{15}$
 $= \frac{1}{15}$

CEVAP: A

5. $a_n = \frac{6n+k}{3n-7}$
Kökler $n = \frac{7}{3}$, $n = -\frac{k}{6}$

$$\frac{7}{3} \quad -\frac{k}{6}$$

 $+ \quad - \quad +$
 $\underbrace{\quad}_{4 \text{ tam sayı var}}$

$6 \leq -\frac{k}{6} < 7$ olmalı
 $36 \leq -k < 42$
 $-36 \geq k > -42$
 k sayısı $-36, -37, -38, -39, -40, -41$ olmak üzere
6 tam sayı değeri alır.

CEVAP: C

6. $a_n = n^2 - 6n + m$
 $n = -\frac{-6}{2} = 3$ için $a_3 = -7$ dir.
 $a_3 = 9 - 18 + m = -7$
 $\Rightarrow m = 9 - 7 = 2$

CEVAP: C

7. $a_n = |2n - 5| + 3 < 12$
 $\Rightarrow |2n - 5| < 9$
 $\Rightarrow -9 < 2n - 5 < 9$
 $\Rightarrow -4 < 2n < 14$
 $\Rightarrow -2 < n < 7$

n sayısı $1, 2, 3, 4, 5, 6$ olmak üzere 6 değer alır.

CEVAP: E

8. $a_n = \log_2(n+3) - 5$ ifadesinin tam sayı değer alması için $n+3, 2$ nin pozitif tam sayı kuvvetleri olmalı
 $n+3=2 \Rightarrow n=-1$
 $n+3=4 \Rightarrow n=1$
 $n+3=8 \Rightarrow n=5$ } ilk 30 terimden
 $n+3=16 \Rightarrow n=13$ } 4 tanesi tam sayıdır.
 $n+3=32 \Rightarrow n=29$
 $n+3=64 \Rightarrow n=61$

CEVAP: B

Diziler

9. $\frac{n}{n^2+6n+8} = \frac{n}{(n+2)(n+4)} = \frac{A}{n+2} + \frac{B}{n+4}$
 $n = An + 4A + Bn + 2B$
 $n = n(A+B) + 4A + 2B$
 $A + B = 1$ ve $4A + 2B = 0$
 $A - 2A = 1$ $B = -2A$
 $A = -1$
 $B = 2$
 $\frac{n}{n^2+6n+8} = -\frac{1}{n+2} + 2 \cdot \frac{1}{n+4}$
 $= -a_n + 2b_n$ olur.

10. $1 \cdot 3 + 2 \cdot 5 + 3 \cdot 7 + \dots + 11 \cdot 23 = \sum_{n=1}^{11} n \cdot (2n+1)$
 $= \sum_{n=1}^{11} (2n^2 + n)$

11. $a_{10} - a_5 = 5d = 35 \Rightarrow d = 7$
 $a_{20} - a_{10} = 10d = 10 \cdot 7 = 70$ bulunur.

12. $S_n = \frac{n}{2}(2a_1 + (n-1)d)$
 $S_{10} = \frac{10}{2}(2a_1 + 9d) \Rightarrow 265 = 5(2a_1 + 9d)$
 $S_8 = \frac{8}{2}(2a_1 + 7d) \Rightarrow \frac{172}{53} = 4(2a_1 + 7d)$
 $- \frac{43}{10} = 2a_1 + 7d$
 $10 = 2d \Rightarrow d = 5$
 $a_1 = 4$

CEVAP: C

13. $-5 = a_1$
 $25 = a_n$ olsun.
 $a_n = a_1 + (n-1)d$
 $25 = -5 + (n-1) \cdot \frac{5}{3}$
 $30 \cdot \frac{3}{5} = n - 1$
 $19 = n$
17 terim eklenmiştir.

CEVAP: B

14. $P_n = 3 \frac{n^2-n}{2}$
 $a_n = \frac{P_n}{P_{n-1}}$
 $= \frac{3 \frac{n^2-n}{2}}{3 \frac{(n-1)^2-(n-1)}{2}}$
 $= \frac{3 \frac{n^2-n}{2}}{3 \frac{n^2-3n+2}{2}}$
 $= 3 \frac{n^2-n}{2} - \frac{n^2-3n+2}{2}$
 $= 3^{n-1}$ olur.

CEVAP: C

Y
A
R
G
I
CEVAP: B

Y
A
R
G
I
CEVAP: E

15. $a_5 - a_4 = 96 \Rightarrow a_2 \cdot r^3 - a_2 \cdot r^2 = 96$
 $a_4 - a_3 = 48 \Rightarrow a_2 \cdot r^2 - a_2 \cdot r = 48$
 $a_2 r^2 (r-1) = 96$
 $a_2 r (r-1) = 48$ } oranlanırsa $r = 2$ olur.

$a_2 r (r-1) = 48$ eşitliğinde $r = 2$ yazılırsa
 $a_2 \cdot 2(2-1) = 48 \Rightarrow a_2 = 24$ bulunur.

CEVAP: C

16. $\frac{2x-1, 2x, 2x+5, x+y}{(2x-1) \cdot (2x+5)} = (2x)^2$
 $4x^2 + 10x - 2x - 5 = 4x^2$
 $8x = 5$
 $x = \frac{5}{8}$
 $\frac{2}{8}, \frac{10}{8}, \frac{50}{8}, x+y \Rightarrow x+y = \frac{250}{8}$
 $\Rightarrow y = \frac{250}{8} - \frac{5}{8} = \frac{245}{8}$ bulunur.

CEVAP: D

CEVAP: C



Diziler

Çözüm 6

1. $a_n = \sqrt{n+9}$

$n+9$ sayısı 16, 25, 36, 49, 64, 81, 100 iken $a_n \in \mathbb{Q}$ olur.

n sayısı 7, 16, 27, 40, 55, 72, 91 olmak üzere, 7 değer alır.

CEVAP: C

2. $a_n = \sum_{k=1}^n (2k^2 + 1)$

$$a_1 = \sum_{k=1}^1 (2k^2 + 1) = 3$$

$$a_2 = \sum_{k=1}^2 (2k^2 + 1) = 3 + 9 = 12$$

$$a_3 = \sum_{k=1}^3 (2k^2 + 1) = 3 + 9 + 19 = 31$$

$$a_1 + a_2 + a_3 = 31 + 12 + 3 = 46$$

$$\begin{aligned} a_1 &= \frac{1}{-1} - \frac{1}{1} \\ a_2 &= \frac{1}{1} - \frac{1}{3} \\ a_3 &= \frac{1}{3} - \frac{1}{5} \\ &\vdots \\ + a_8 &= \frac{1}{13} - \frac{1}{15} \\ a_1 + a_2 + \dots + a_8 &= -1 - \frac{1}{15} = -\frac{16}{15} \end{aligned}$$

CEVAP: E

3. $a_n = \log_3(n+2) < 4$

$$0 < n+2 < 3^4$$

$$-2 < n < 79$$

n değerleri 1, 2, 3, ..., 78 olmak üzere 78 değer alır.

CEVAP: D

4. $a_n = \frac{2n-10}{n+1} = 2 - \frac{12}{n+1}$

$\frac{12}{n+1}$ tam sayı olması için n değerleri

5, 3, 2, 1 olmak üzere 4 değer alır.

CEVAP: C

$$\begin{aligned} 6. \quad 2n+1 &= \frac{4.a_n - 1}{a_n + 1} \\ \Rightarrow (2n+1).a_n + 2n+1 &= 4.a_n - 1 \\ a_n \cdot (2n-3) &= -2n-2 \\ a_n &= \frac{-2n-2}{2n-3} \text{ bulunur.} \end{aligned}$$

CEVAP: A

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$$\begin{aligned} 7. \quad a_6 + a_7 - a_8 &= a_7 + 5.7 + 2 - a_9 \\ &= 5.7 + 2 + 37 - 5.9 - 2 \\ &= 35 + 2 + 37 - 47 \\ &= 74 - 47 = 27 \text{ bulunur.} \end{aligned}$$

CEVAP: B

8. $a_1 = x, a_n = 3x, d = y$

$$a_n - a_1 = (n-1).d \Rightarrow 3x - x = (n-1).y$$

$$\Rightarrow \frac{2x}{y} + 1 = n$$

$$\begin{aligned} S_n &= \frac{n}{2}(a_1 + a_n) = \frac{1}{2}\left(\frac{2x}{y} + 1\right).(x + 3x) \\ &= 2x\left(\frac{2x}{y} + 1\right) \\ &= \frac{4x^2}{y} + 2x \text{ bulunur.} \end{aligned}$$

CEVAP: D

9. $a_7 = 2.a_5 - 16 \Rightarrow a_1 + 6d = 2(a_1 + 4d) - 16$
 $\Rightarrow [a_1 + 2d = 16] \quad ①$
 $a_9 = 2a_7 - 17 \Rightarrow a_1 + 8d = 2(a_1 + 6d) - 17$
 $\Rightarrow [a_1 + 4d = 17] \quad ②$

① ve ② ortak çözülürse

$$\begin{array}{r} a_1 + 2d = 16 \\ - a_1 + 4d = 17 \\ \hline d = \frac{1}{2}, a_1 = 15 \text{ olur.} \end{array}$$

10. $S_1 = a_1 = 2 + 5 = 7$

$$S_n = \frac{n}{2}(a_1 + a_n) \Rightarrow 2n^2 + 5n = \frac{n}{2}(7 + a_n)$$
 $\Rightarrow 4n + 10 = 7 + a_n$
 $\Rightarrow a_n = 4n + 3 \text{ bulunur.}$

CEVAP: B

$$\begin{aligned} 11. & -3 + 6 - 12 + 24 - 48 + \dots - \underbrace{768}_{-3 \cdot 1 + 3 \cdot 2 - 3 \cdot 2^2 + 3 \cdot 2^3 - \dots - 3 \cdot 2^8} \\ & = -3(1 - 2 + 2^2 - 2^3 + \dots + 2^8) \\ & = -3 \cdot \frac{1 - (-2)^9}{1 - (-2)} \\ & = -(1 + 512) \\ & = -513 \text{ bulunur.} \end{aligned}$$

CEVAP: E

12. $\frac{1+3+3^2+\dots+3^9}{1+9+9^2+\dots+9^4} = \frac{\frac{3^{10}-1}{3-1}}{\frac{9^5-1}{9-1}}$
 $= \frac{3^{10}-1}{2} \cdot \frac{8}{9^5-1}$
 $= 4 \text{ bulunur.}$

CEVAP: C

$$\begin{aligned} 13. & \overbrace{2xy = xy^2 + x} \\ & 2y = y^2 + 1 \\ & \Rightarrow y^2 - 2y + 1 = 0 \\ & \Rightarrow y = 1 \\ & x - y = 1 - 1 = 0 \text{ bulunur.} \end{aligned} \quad \left| \begin{array}{l} x + y = xy^2 + x \\ \Rightarrow x + 1 = x + x \\ \Rightarrow x = 1 \end{array} \right.$$

CEVAP: C

$$\begin{aligned} 14. & \frac{S_{12}}{S_4} = 6 \Rightarrow \frac{\cancel{a_1} \cdot \frac{1-r^{12}}{1-r}}{\cancel{a_1} \cdot \frac{1-r^4}{1-r}} = 6 \\ & \Rightarrow \frac{(1-r^4)(1+r^4+r^8)}{1-r^4} = 6 \\ & \Rightarrow r^8 + r^4 + 1 = 6 \\ & \frac{a_9+a_5+a_1}{a_1} = \frac{a_9}{a_1} + \frac{a_5}{a_1} + 1 \\ & = r^8 + r^4 + 1 = 6 \text{ bulunur.} \end{aligned}$$

CEVAP: B

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$$\begin{aligned} 15. & a_n \cdot a_{2n} \cdot a_{3n} \cdot a_{4n} \cdot a_{5n} = 2^{45n} \\ & \Rightarrow a_{3n}^2 \cdot a_{3n}^2 \cdot a_{3n} = 2^{45n} \\ & \Rightarrow a_{3n}^5 = 2^{45n} \\ & \Rightarrow a_{3n} = 2^{9n} \\ & \Rightarrow a_n = 2^{3n} = 8^n \text{ bulunur.} \end{aligned}$$

CEVAP: D

16. $a_1 = 2^{12} \cdot 4 = 2^{14}$ (1. günün sonu)
 $a_8 = 2^{14} \cdot 4^7 = 2^{14} \cdot 2^{14} = 2^{28}$ (8. günün sonu)
 $a_{10} = 2^{14} \cdot 4^9 = 2^{14} \cdot 2^{18} = 2^{32}$ (10. günün sonu)
 $\frac{a_{10}}{a_8} = \frac{2^{32}}{2^{28}} = 2^4 = 16 \text{ bulunur.}$

CEVAP: C

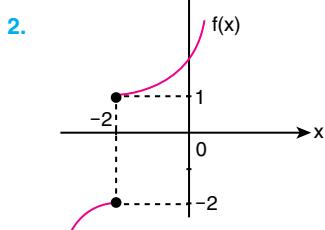


Limit ve Sürekliklilik

Çözüm 1

1. $\lim_{x \rightarrow 0} \frac{2^{3x} + 2}{\sin x - \cos x} = \frac{2^0 + 2}{\sin 0 - \cos 0} = \frac{1+2}{0-1} = \frac{3}{-1} = -3$

CEVAP: B



3. $f(x) = \begin{cases} x^2 - 2x + 3 & , x \leq 1 \\ 3x + 5 & , 1 < x \end{cases}$

$$\begin{aligned} \lim_{x \rightarrow 1^+} f(x) + \lim_{x \rightarrow 0} f(x) \\ = \lim_{x \rightarrow 1^+} (3x + 5) + \lim_{x \rightarrow 0} (x^2 - 2x + 3) \\ = 3 \cdot 1 + 5 + 0^2 - 2 \cdot 0 + 3 = 11 \end{aligned}$$

4. $\lim_{x \rightarrow 4^-} \frac{x-5}{4+x} = -\frac{1}{4+4^-} = -\frac{1}{8} = -\frac{1}{8}$

CEVAP: B

5. $\lim_{x \rightarrow 0^+} 7^{-\frac{2}{x}} = 7^{-\frac{2}{0}} = 7^{-\infty} = \frac{1}{7^\infty} = \frac{1}{\infty} = 0$

CEVAP: C

6. $\lim_{x \rightarrow -\infty} \left(5^x - \frac{2}{x} + 3 \right) = 5^{-\infty} - \frac{2}{-\infty} + 3 = \frac{1}{5^\infty} + \frac{2}{\infty} + 3 = \frac{1}{\infty} + 0 + 3 = 0 + 3 = 3$

CEVAP: C

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7. $\lim_{x \rightarrow 3^+} \left(\frac{4^{\frac{1}{3-x}} + 3}{2} \right)$
 $= \frac{4^{\frac{1}{3-3^+}} + 3}{2} = \frac{4^0 + 3}{2}$
 $= \frac{4^{-\infty} + 3}{2} = \frac{0 + 3}{2} = \frac{3}{2}$

CEVAP: B

CEVAP: E

8. $f(x) = \begin{cases} x^2 - a & , x < 2 \\ 3x - 4 & , 2 \leq x \end{cases}$

 $x = 2$ de limiti varsa

$$\begin{aligned} \lim_{x \rightarrow 2^+} f(x) &= \lim_{x \rightarrow 2^-} f(x) \\ 3 \cdot 2 - 4 &= 2^2 - a \\ 2 &= 4 - a \Rightarrow a = 2 \end{aligned}$$

CEVAP: D

CEVAP: A

Limit ve Sürekllilik

9. $\lim_{x \rightarrow 5^-} \frac{|x-5|}{2x-10} = \frac{\cancel{-1}}{2(\cancel{x-5})} = -\frac{1}{2}$

CEVAP: A

10. $\lim_{x \rightarrow 1^+} \frac{(1-x^2)}{|1-x|} = \frac{(1-\cancel{x})(1+x)}{\cancel{-1+x}} = \frac{2}{-1} = -2$

CEVAP: A

11. $\lim_{x \rightarrow -2^+} f(x) + \lim_{x \rightarrow 1^-} f(x) = 2 + 4 = 6$

CEVAP: B

12. $\lim_{x \rightarrow -3^-} f(x) + \lim_{x \rightarrow 0} f(x) = 0 + 3 = 3$

CEVAP: B

13. $[-3, 4]$ aralığında

$$\left. \begin{array}{l} \lim_{x \rightarrow -2^+} f(x) = 2 \\ \lim_{x \rightarrow -2^-} f(x) = 1 \end{array} \right\} x = -2 \text{ de limiti yok bir noktada limiti yok.}$$

CEVAP: A

14. $\lim_{\substack{x \rightarrow -3^+ \\ -3 < x}} f(x+1) + \lim_{\substack{x \rightarrow 1^- \\ x < 1}} f(x+3)$
 $-2 < x+1 \quad x+3 < 4$

$$= \lim_{x \rightarrow -2^+} f(x) + \lim_{x \rightarrow 4^-} f(x) = 2 + 0 = 2$$

CEVAP: A

15. $\lim_{x \rightarrow 4} \sqrt{3x+13} = \sqrt{3 \cdot 4 + 13} = \sqrt{12 + 13} = \sqrt{25} = 5$

CEVAP: C

16. $\lim_{x \rightarrow 3} f(x) = 2 \implies f(3) = 2$

$$\lim_{x \rightarrow -2} \frac{f(x+5) + 3f(2x+7)}{f(x^2-1)} = \frac{f(3) + 3 \cdot f(3)}{f(3)} = \frac{2 + 3 \cdot 2}{2} = 4$$

CEVAP: B



Limit ve Sürekliklilik

Cözüm 2

1. $(0, 5)$ aralığındaki

$$\begin{array}{ll} \lim_{x \rightarrow 1^-} f(x) = \text{yok} & \lim_{x \rightarrow 2^+} f(x) = 4 \\ \lim_{x \rightarrow 3^-} f(x) = 4 & \lim_{x \rightarrow 4^-} f(x) = \text{yok} \end{array}$$

limitler toplamı $= 4 + 4 = 8$

2. $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x^2 - 4} = \frac{0}{0}$

$$\begin{aligned} \lim_{x \rightarrow 2} \frac{(x-2)(x^2 + 2x + 4)}{(x-2)(x+2)} &= \frac{4+4+4}{2+2} \\ &= \frac{12}{4} = 3 \end{aligned}$$

3. $\lim_{x \rightarrow 3} \frac{x^2 - 2x - 3}{x^2 + 3x - 18} = \frac{0}{0}$

$$\lim_{x \rightarrow 3} \frac{(x-3)(x+1)}{(x+6)(x-3)} = \frac{4}{9}$$

4. $\lim_{x \rightarrow 1} \frac{\sqrt{x} - 1}{1 - x^2} = \frac{0}{0}$

$$\begin{aligned} \lim_{x \rightarrow 1} \frac{\sqrt{x} - 1}{(1-x)(1+x)} &= \lim_{x \rightarrow 1} \frac{(\sqrt{x}-1)}{(\cancel{1-\sqrt{x}})(1+\sqrt{x})(1+x)} \\ &= \frac{-1}{2 \cdot 2} = \frac{-1}{4} \end{aligned}$$

5. $\lim_{x \rightarrow 4} \frac{\sqrt{2x+1} - 3}{x-4} = \frac{0}{0}$

$$\lim_{x \rightarrow 4} \frac{(\sqrt{2x+1} - 3) \cdot (\sqrt{2x+1} + 3)}{(x-4) \cdot (\sqrt{2x+1} + 3)}$$

$$\lim_{x \rightarrow 4} \frac{2x-8}{(\cancel{x-4})(\sqrt{2x+1} + 3)} = \frac{2}{6} = \frac{1}{3}$$

CEVAP: C

6. $\lim_{x \rightarrow 0^-} \left(\frac{|x|}{x^2 - 3x} \right) = \lim_{x \rightarrow 0^-} \frac{-x}{x^2 - 3x}$
 $= \lim_{x \rightarrow 0^-} \frac{\cancel{x}}{x(x-3)} = \frac{-1}{-3} = \frac{1}{3}$

CEVAP: D

7. $\lim_{x \rightarrow 5^-} | |x-5| - 4 |$
 $= \lim_{x \rightarrow 5^-} | -x+5-4 | = \lim_{x \rightarrow 5^-} | -x+1 |$
 $= 4$

CEVAP: B

8. $\lim_{x \rightarrow 0} \frac{\sin 4x}{3x} = \frac{4}{3}$

CEVAP: C

CEVAP: A

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CEVAP: C

9. $\lim_{x \rightarrow 2} \frac{x^2 + mx + 6}{x^2 - 3x + 2} = 1$

$$4 + 2m + 6 = 0 \Rightarrow 2m = -10 \\ \Rightarrow m = -5$$

CEVAP: A

CEVAP: D

10. $f(x) = 3x - 2 \quad g(x) = \frac{x}{4} - \frac{4}{x}$

$$\lim_{x \rightarrow 2} \frac{g(f(x))}{2-x} = \frac{\frac{3x-2}{4} - \frac{4}{3x-2}}{2-x}$$

$$= \frac{9x^2 - 12x + 4 - 16}{4(3x-2)(2-x)} = \frac{9x^2 - 12x - 12}{4(3x-2)(2-x)}$$

$$= \frac{3(\cancel{x-2})(3x+2)}{4(3x-2)(\cancel{2-x})} = \frac{3 \cdot 8}{4 \cdot 4 \cdot -1}$$

$$= -\frac{24}{16} = -\frac{3}{2}$$

CEVAP: C

CEVAP: C

Limit ve Sürekllilik

11. $\lim_{x \rightarrow \infty} \frac{2x^2 - 3x + 1}{x^2 + 4x + 3} = \frac{\infty}{\infty}$

$$\lim_{x \rightarrow \infty} \frac{x^2 \left(2 - \frac{3}{x} + \frac{1}{x^2}\right)}{x^2 \left(1 + \frac{4}{x} + \frac{3}{x^2}\right)} = 2$$

CEVAP: B

12. $\lim_{x \rightarrow \infty} \frac{(a-2)x^2 + 3x - 1}{2x + 3} = b$

$$a-2=0 \quad \lim_{x \rightarrow \infty} \frac{3x-1}{2x+3} = \frac{3}{2} = b$$

$$a=2$$

$$a.b = 2 \cdot \frac{3}{2} = 3$$

CEVAP: B

13. $f(x) = |x+2| - 3$

$$g(x) = 2x - 1$$

$$\lim_{x \rightarrow a} \frac{f(x) - g(3)}{x - a} = 1$$

$$f(a) = g(3)$$

$$|a+2| - 3 = 5$$

$$|a+2| - 3 = 5 \quad \text{ve} \quad |a+2| - 3 = -5$$

$$|a+2| = 8 \quad \text{ve} \quad |a+2| = -2$$

kök yok

$$a+2 = 8 \quad \text{ve} \quad a+2 = -8$$

$$a = 6 \quad \text{ve} \quad a = -10$$

limit değerini
sağlamaz.

CEVAP: C

14. P(x) baş katsayısı 3 olan ikinci dereceden bir polinom

$$P(2) = P(1) = 0$$

$$P(x) = 3(x-2)(x-1)$$

Q(x) başkatsayısı (-1) olan üçüncü dereceden bir polinom

$$Q(2) = Q(-1) = Q(1) = 0$$

$$Q(x) = (-1)(x-2)(x-1)(x+1)$$

$$\lim_{x \rightarrow 2} \frac{3(x-2)(x-1) + (x-2)(x-1)(x+1)}{x-2}$$

$$\lim_{x \rightarrow 2} \frac{(x-2)[3(x-1) + (x-1)(x+1)]}{x-2}$$

$$\lim_{x \rightarrow 2} \frac{3.1 + 1.3}{1} = 6$$

CEVAP: B

15. $f(x) = 2^{\frac{x-1}{|x-1|}}$

$$g(x) = \sin\left(\frac{\pi x}{4}\right) \cdot \cos\left(\frac{\pi x}{4}\right)$$

$$f(1^-) = 2^{\frac{x-1}{1-x}} = 2^{-1} = \frac{1}{2}$$

$$g(1^-) = \sin\left(\frac{\pi}{4}\right) \cdot \cos\left(\frac{\pi}{4}\right)$$

$$= \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{2}}{2} = \frac{2}{4} = \frac{1}{2}$$

$$\lim_{x \rightarrow 1^-} (f \cdot g)(x) = f(1^-) \cdot g(1^-)$$

$$= \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

CEVAP: C

16. f fonksiyonu “n kişinin yan yana sıralanması” olarak tanımlanıyor.

$$f(n) = n!$$

g fonksiyonu “belirli iki kişi yan yana olmak koşuluyla n kişinin sıralaması” olarak tanımlanıyor.

$$g(n) = (n-1)! \cdot 2!$$

$$\lim_{n \rightarrow 5} \frac{f(n)}{g(n)} = \frac{f(5)}{g(5)} = \frac{5!}{4!2!}$$

$$= \frac{5 \cdot 4!}{4! \cdot 2} = \frac{5}{2}$$

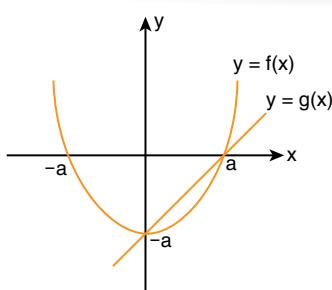
CEVAP: D



Limit ve Sürekliklilik

Cözüm 3

1.



$$f(x) = m(x - a)(x + a)$$

$$x = 0 \quad y = -a$$

$$m \cdot (-a) \cdot (a) = -a$$

$$m = \frac{1}{a}$$

$$y = g(x)$$

$$\frac{x}{a} + \frac{y}{-a} = 1$$

$$y = g(x)$$

$$\frac{x}{a} - 1 = \frac{y}{a}$$

$$x - a = y \Rightarrow g(x) = x - a$$

$$\lim_{x \rightarrow a} \frac{f(x) - g(x)}{x - a} = \frac{f(a) - g(a)}{x - a}$$

$$\lim_{x \rightarrow a} \frac{\frac{1}{a}(x-a)(x+a) - (x-a)}{x-a} = \frac{0-0}{0} = \frac{0}{0} \text{ belirsizliği}$$

$$\lim_{x \rightarrow a} \frac{\left(\frac{1}{a}(x-a) \right) \left[\frac{1}{a}(x+a) - 1 \right]}{x-a}$$

$$= \frac{1}{a} \cdot 2a - 1 = 1$$

CEVAP: D

2. $x < 30$ olduğundan $f(12) = 2^2 \cdot 3$ pozitif bölenleri sayısı $3 \cdot 2 = 6$ dir. $144 > 30$ olduğundan $f(144) = 2^4 \cdot 3^2$ asal bölenleri sayısı 2 dir.

$$\lim_{x \rightarrow 12} (f(x) - f(x^2))$$

$$= f(12) - f(144) = 6 - 2 = 4$$

CEVAP: A

3. $x^2 - 5x - 7 = 0$ denkleminin kökleri x_1 ve x_2 ise

$$x_1 + x_2 = 5 \quad x_1 x_2 = -7$$

$$\lim_{n \rightarrow 1} \frac{1}{x_n} + \frac{1}{x_{n+1}} = \frac{1}{x_1} + \frac{1}{x_2}$$

$$= \frac{x_1 + x_2}{x_1 x_2} = \frac{5}{-7} = -\frac{5}{7}$$

CEVAP: B

$$4. \quad f(x) = \begin{cases} x^2 - 1, & x < 1 \text{ ise} \\ 3x + 2, & x \geq 1 \text{ ise} \end{cases}$$

$$g(x) = \begin{cases} 5, & x < 2 \text{ ise} \\ x^3 + 1, & x \geq 2 \text{ ise} \end{cases}$$

$$\lim_{x \rightarrow 1^+} [3f(x) + g(x+1)] = 3f(1^+) + g(2^+)$$

$$= 3[3 \cdot 1 + 2] + [2^3 + 1]$$

$$= 15 + 9 = 24$$

CEVAP: E

5. $f(-1) = 7$

$$\lim_{x \rightarrow 2^-} f(x) = 4$$

$$\lim_{x \rightarrow 1} f(x) = 5$$

$$\text{i. } \lim_{x \rightarrow -1^+} f(x) = 7$$

fonksiyon sürekli olduğundan (-1) deki değeri $(-1)^+$ e sağdan yaklaşlığında eşitlik sağlanır.

$$\text{II. } f(2) = 4$$

fonksiyon sürekli olduğundan 2'ye soldan yaklaşlığındaki değere eşittir.

$$\text{III. } \lim_{x \rightarrow 1^-} f(x) = 5$$

fonksiyonun $\lim_{x \rightarrow 1} f(x) = 5$ de limiti varsa soldan limit eşit olmalıdır.

CEVAP: E

$$6. \quad \lim_{x \rightarrow 5} \sqrt{9x + \sqrt{x^2 - 9}}$$

$$= \sqrt{45 + \sqrt{25 - 9}} = \sqrt{45 + 4}$$

$$= \sqrt{49} = 7$$

CEVAP: B

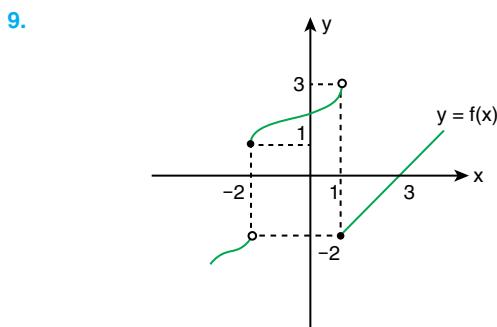
Limit ve Sürekllilik

7. $\lim_{x \rightarrow 2^+} \frac{x^2 - 4}{|x - 2|} + \log_3(x^4 + 5x + 1)$
 $\lim_{x \rightarrow 2^+} \frac{(x-2)(x+2)}{x-2} + \log_3(x^4 + 5x + 1)$
 $= 4 + \log_3(16 + 10 + 1) = 4 + \log_3 27$
 $= 4 + \log_3 3^3 = 4 + 3 = 7$

CEVAP: C

8. $f(x) = x^2 - 3x + 2 \quad f(3) = 2$
 $\lim_{x \rightarrow 3} \frac{f^2(x) - 5f(x).f(3) + 4f^2(3)}{x - 3}$
 $= \lim_{x \rightarrow 3} \frac{[f(x) - 4f(3)][f(x) - f(3)]}{x - 3}$
 $= \lim_{x \rightarrow 3} \frac{(f(x) - 4f(3))(x^2 - 3x)}{x - 3}$
 $= \lim_{x \rightarrow 3} \frac{(f(x) - 4f(3))x \cdot (x-3)}{x-3}$
 $= (f(3) - 4f(3)).3$
 $= -9.f(3) = -9.2 = -18$

CEVAP: A



$$\begin{aligned} & \lim_{x \rightarrow 1^+} f(f(x)) + \lim_{x \rightarrow -2^-} f(x+3) \\ &= f(f(1^+)) + f(1^-) \\ &= f(-2^-) + 3 = 1 + 3 = 4 \end{aligned}$$

CEVAP: D

10. $\lim_{x \rightarrow 3} \frac{f(x) - 2}{x - 3} = 5 \Rightarrow f(3) = 2$

$$\lim_{x \rightarrow 2} \frac{f(x) - 5}{x^2 - 4} = 3 \Rightarrow f(2) = 5$$

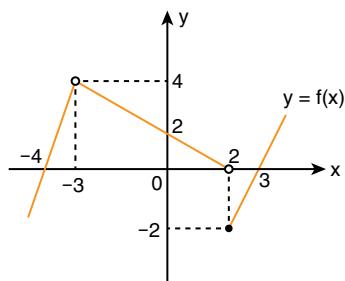
$$h(1) = f(2).f(3) + f(3) \\ = 5.2 + 2 = 12$$

$$h(x) = f(x+1).f(3x) + f(x+2)$$

$$\begin{aligned} \lim_{x \rightarrow 1} \frac{h(x) - 7}{f(2x)} &= \frac{h(1) - 7}{f(2)} \\ &= \frac{12 - 7}{5} = \frac{5}{5} = 1 \end{aligned}$$

CEVAP: B

11.



I. $\lim_{x \rightarrow 3^-} f(x) = -2$

yanlış $\lim_{x \rightarrow 3^-} f(x) = 0$

II. f fonksiyonu $x = -3$ de süreklidir. (yanlış)

$$\lim_{x \rightarrow -3^+} f(x) = \lim_{x \rightarrow -3^-} f(x) \neq f(-3)$$

III. f fonksiyonu $x = 2$ de süreksizdir.

$$\lim_{x \rightarrow 2^+} f(x) \neq \lim_{x \rightarrow 2^-} f(x) = f(2)$$

IV. $\lim_{x \rightarrow 0^-} f(x+2) = f(2^-) = 0$

III ve IV doğrudur.

CEVAP: E

12. $\lim_{x \rightarrow \infty} \frac{5x^2 - 4}{x^2}$

$$\begin{aligned} &= \lim_{x \rightarrow \infty} \frac{5x^2}{x^2} - \frac{4}{x^2} = 5 - \frac{4}{\cancel{x^2}^0} \\ &= 5 \end{aligned}$$

CEVAP: E



Limit ve Sürekliklilik

Çözüm 4

1. $\lim_{x \rightarrow \frac{\pi}{4}^-} \frac{1 - \tan x}{\sin x - \cos x} = \frac{0}{0}$

$$\lim_{x \rightarrow \frac{\pi}{4}^-} \frac{1 - \frac{\sin x}{\cos x}}{\sin x - \cos x}$$

$$= \lim_{x \rightarrow \frac{\pi}{4}^-} \frac{\frac{\cos x - \sin x}{\cos^2 x}}{\cos x(\sin x - \cos x)} = \frac{-1}{\frac{\sqrt{2}}{2}} \\ = \frac{-2}{\sqrt{2}} = -\sqrt{2}$$

CEVAP: A

2. $\lim_{x \rightarrow 2} \frac{x^2 - \sqrt{n}}{x - 2} = \frac{0}{0}$

$$4 - \sqrt{n} = 0 \quad \sqrt{n} = 4 \quad n = 16$$

$$\lim_{x \rightarrow 2} \frac{x^2 - \sqrt{16}}{x - 2} = \lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$$

$$= \lim_{x \rightarrow 2} \frac{(x-2)(x+2)}{(x-2)} = 4$$

CEVAP: D

3. $f(1 + 3x) + f(1 - 3x) = x^{20}$

$$\lim_{x \rightarrow 3} \frac{f(x+1) + f(1-x)}{x-2} = \frac{f(4) + f(-2)}{1} \\ = 1$$

$$x = 1 \text{ için } f(4) + f(-2) = 1^{20} = 1$$

CEVAP: C

4. $\lim_{x \rightarrow \frac{\pi}{2}^-} \frac{\sqrt{1 - \sin x}}{\cos x} = \frac{0}{0}$

$$\lim_{x \rightarrow \frac{\pi}{2}^-} \frac{\sqrt{1 - \sin x} \cdot \sqrt{1 + \sin x}}{\cos x \cdot \sqrt{1 + \sin x}}$$

$$\lim_{x \rightarrow \frac{\pi}{2}^-} \frac{\sqrt{1 - \sin^2 x}}{\cos x \sqrt{1 + \sin x}} = \frac{\sqrt{\cos^2 x}}{\cos x \sqrt{1 + \sin x}}$$

$$= \frac{\cos x}{\cos x \sqrt{1 + \sin x}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

CEVAP: D

5. $f(x) = \begin{cases} ax - 3 & , x < 2 \\ 5 & , x = 2 \\ 2x + b & , x > 2 \end{cases}$

$$\lim_{x \rightarrow 2^-} f(x) = \lim_{x \rightarrow 2^+} f(x) = f(2) \\ 2a - 3 = 4 + b = 5$$

$$2a - 3 = 5 \quad b + 4 = 5$$

$$a = 4 \quad b = 1$$

$$a + b = 4 + 1 = 5$$

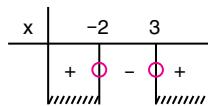
CEVAP: B

6. $f(x) = \frac{\ln(x^2 - x - 6)}{x - 5}$

$$x - 5 \neq 0$$

$$x \neq 5 \\ x^2 - x - 6 > 0$$

$$x^2 - x - 6 = 0 \\ x \rightarrow -3 = 0 \quad x = 3 \\ x \rightarrow +2 = 0 \quad x = -2$$



$$\mathcal{C}K = (-\infty, -2) \cup (3, \infty) - \{5\}$$

x tam sayıları toplamı

$$= -3 - 2 - 1 + 0 + 1 + 2 + 3 + 4 + 5 + 6 = -8$$

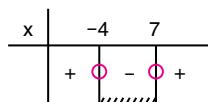
CEVAP: E

7. $f(x) = \sqrt{x^2 - 3x - 28}$

$x^2 - 3x - 28 \geq 0$ sürekli olduğu kümeye

$x^2 - 3x - 28 < 0$ süreksiz olduğu kümeye

$$x^2 - 3x - 28 = 0 \\ x \rightarrow -7 = 0 \quad x = 7 \\ x \rightarrow +4 = 0 \quad x = -4$$



$$\mathcal{C}K = (-4, 7)$$

x tam sayıları toplamı

$$= -3 - 2 - 1 + 0 + 1 + 2 + 3 + 4 + 5 + 6 = 15$$

CEVAP: C

Limit ve Sürekliklilik

8. $f(x) = \frac{3x+2}{x^2-6x+2k+1}$

gerçek sayılarla sürekli ise paydayı sıfır yapan değer yoktur yani gerçek kök yoktur.

$\Delta < 0$ dır.

$$b^2 - 4ac < 0$$

$$(-6)^2 - 4 \cdot 1 \cdot (2k+1) < 0$$

$$36 - 8k - 4 < 0 \Rightarrow 32 < 8k$$

$$\Rightarrow 4 < k$$

CEVAP: D

9. $f(x) = x^2 - mx + 3$

$$\lim_{x \rightarrow 2} f(x) = 11 \Rightarrow f(2) = 11$$

$$2^2 - 2m + 3 = 11 \Rightarrow 7 - 2m = 11$$

$$\Rightarrow -2m = 4$$

$$\Rightarrow m = -2$$

CEVAP: A

10. $\lim_{x \rightarrow 3^+} f(x) = \lim_{x \rightarrow 3^-} f(x) = f(3)$

$$9a - b = -2$$

$$\lim_{x \rightarrow -1^-} f(x) = \lim_{x \rightarrow -1^+} f(x) = f(-1)$$

$$-b - 7 = -2 \Rightarrow b = -5$$

$$9a + 5 = -2 \Rightarrow a = -\frac{7}{9}$$

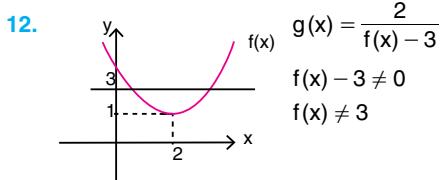
CEVAP: D

11. $[-2, 2]$ aralığında

x	limit	sürekli
-2	yok	yok
-1	var	var
0	var	var
1	var	yok
2	var	var

$$x \text{ tam sayıları} = -1 + 0 + 2 = 1$$

CEVAP: D



grafiği iki noktada kestiği için $g(x)$ iki nokta için sürekli değildir.

CEVAP: B

13. $f(x) = \begin{cases} \frac{2x-1}{x^2-9}, & x \leq 0 \\ \frac{3x+2}{x^2-1}, & 0 < x \end{cases}$

süreksiz olduğu noktalar tanımsız yapan noktalardır.

$$x^2 - 9 = 0 \quad x^2 - 1 = 0$$

$$x^2 = 9 \quad x^2 = 1$$

$$x = 3 \text{ ve } x = -3 \quad x = 1 \text{ ve } x = -1$$

Y **A** **R** **G** **I** **Y** **A** **T** **N** **E** **V** **I** **CEVAP: D**
x ≤ 0 olduğu için 0 < x olduğu için
 $x = -3$ $x = 1$

$$\text{kritik nokta } \lim_{x \rightarrow 0^+} f(x) = \lim_{x \rightarrow 0^-} f(x) = f(0)$$

$$x = 0 \text{ için } \frac{2}{-1} \neq \frac{-1}{-9}$$

süreksiz olduğu küme $\{-3, 0, 1\}$

CEVAP: D

14. $f(x) = \begin{cases} \frac{|x-2|}{x-2}, & x \neq 2 \\ 5, & x = 2 \end{cases}$

$$\lim_{x \rightarrow 2^+} f(x) = \lim_{x \rightarrow 2^+} \frac{|x-2|}{x-2} = \frac{x-2}{x-2} = 1 = a$$

$$\lim_{x \rightarrow 2^-} f(x) = \lim_{x \rightarrow 2^-} \frac{|x-2|}{x-2} = \frac{-x+2}{x-2} = -1 = b$$

$$a - b = 1 - (-1) = 2$$

CEVAP: A



1. $f(x) = x^3 - 4x^2 - 7x + 3$

$$f'(x) = 3x^2 - 8x - 7$$

$$f'(-1) = 3 \cdot (-1)^2 - 8 \cdot (-1) = 3 + 8 - 7 = 4$$

CEVAP: C

2. $f(x) = x^2 - (4-x)^3$

$$f'(x) = 2x - 3(4-x)^2 \cdot (-1)$$

$$f'(2) = 2 \cdot 2 - 3(4-2)^2 \cdot (-1) = 4 + 12 = 16$$

CEVAP: E

3. $f(x) = \sqrt[3]{x^2} = x^{\frac{2}{3}}$

$$\frac{df(x)}{dx} = \frac{2}{3} \cdot x^{\frac{2}{3}-1} = \frac{2}{3} \cdot x^{-\frac{1}{3}} = \frac{2}{3\sqrt[3]{x}}$$

CEVAP: A

4. $f(x) = \frac{2x+3}{3x-2}$

$$f'(x) = \frac{2 \cdot (3x-2) - (2x+3) \cdot 3}{(3x-2)^2}$$

$$f'(x) = \frac{2 \cdot (1) - 5 \cdot 3}{1^2} = \frac{2-15}{1} = -13$$

CEVAP: C

5. $f(x) = (x^3 - 1) \cdot (x^2 + 2)$

$$f'(x) = 3x^2(x^2 + 2) + (x^3 - 1) \cdot 2x$$

$$f'(-1) = 3 \cdot ((-1)^2 + 2) + ((-1)^3 - 1) \cdot 2 \cdot (-1) \\ = 9 + 4 = 13$$

CEVAP: C

6. $f(x) = \frac{x^2 \cdot \sqrt[3]{x}}{\sqrt{x}} = \frac{x^2 \cdot x^{\frac{1}{3}}}{x^{\frac{1}{2}}} = x^{\frac{2}{1} + \frac{1}{3} - \frac{1}{2}} = x^{\frac{11}{6}}$

$$f'(x) = \frac{11}{6}x^{\frac{5}{6}}$$

$$f'(1) = \frac{11}{6} \cdot 1^{\frac{5}{6}} = \frac{11}{6}$$

CEVAP: B

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7. $f(x) = x^7 - x^6 + x^5 - x^4 + x^3 - x^2 + x - 1$

$$f'(x) = 7x^6 - 6x^5 + 5x^4 - 4x^3 + 3x^2 - 2x + 1$$

$$f'(-1) = 7 + 6 + 5 + 4 + 3 + 2 + 1 = \frac{7 \cdot 8}{2} = 28$$

CEVAP: C

8. $f(x) = (x-1)(x-2) \dots (x-10)$

$$f'(x) = 1 \cdot (x-2) \dots (x-10)$$

$$+ (x-1) \cdot 1 \dots (x-10)$$

$$+ \dots + (x-1)(x-2)(x-3) \cdot 1 \dots (x-10)$$

$$+ \dots + (x-1)(x-2) \dots 1$$

$$f'(4) = 0 + 0 + 3 \cdot 2 \cdot 1 \cdot (-1) \dots (-6) + 0$$

$$= 6! = 720$$

CEVAP: D

9. $f(x) = \frac{x^2 - 1}{\sqrt{x}}$

$$f'(x) = \frac{2x \cdot \sqrt{x} - (x^2 - 1) \cdot \frac{1}{2\sqrt{x}}}{(\sqrt{x})^2}$$

$$f'(4) = \frac{8 \cdot \sqrt{4} - (16 - 1) \cdot \frac{1}{2\sqrt{4}}}{(\sqrt{4})^2}$$

$$= \frac{16 - \frac{15}{4}}{4} = \frac{49}{16}$$

10. $f(x) = \sqrt[3]{x} - \sqrt{x} - \frac{1}{x} = x^{\frac{1}{3}} - x^{\frac{1}{2}} - x^{-1}$

$$\lim_{h \rightarrow 0} \frac{f(1+h) - f(1)}{h} = f'(1)$$

$$f'(x) = \frac{1}{3} \cdot x^{-\frac{2}{3}} - \frac{1}{2} \cdot x^{-\frac{1}{2}} + x^{-2}$$

$$f'(1) = \frac{1}{3} - \frac{1}{2} + \frac{1}{1} = \frac{2-3+6}{6} = \frac{5}{6}$$

11. $f(x) = \frac{1}{x} + \frac{1}{x^2} + \dots + \frac{1}{x^{10}}$

$$f(x) = x^{-1} + x^{-2} + \dots + x^{-10}$$

$$f'(x) = -1 \cdot x^{-2} - 2x^{-3} \dots - 10x^{-11}$$

$$f'(1) = -1 - 2 \dots - 10 = -\frac{10 \cdot 11}{2} = -55$$

12. $\frac{2}{x} - \frac{1}{y} = 3 \Rightarrow \frac{2}{x} - 3 = \frac{1}{y}$

$$\frac{2-3x}{x} = \frac{1}{y} \Rightarrow y = \frac{x}{2-3x}$$

$$\frac{dy}{dx} = \frac{1 \cdot (2-3x) - x \cdot (-3)}{(2-3x)^2}$$

$$= \frac{2-3x+3x}{(2-3x)^2} = \frac{2}{(2-3x)^2}$$

13. $f(x) = 5x^2 - mx - 8 \quad f'(2) = 12$

$$f'(x) = 10x - m$$

$$f'(2) = 20 - m \quad 20 - m = 12$$

$$m = 8$$

CEVAP: E

CEVAP: D

14. $f(x) = (x-2)(x+2)(x^2+4)$

$$= (x^2-4)(x^2+4) = x^4 - 16$$

$$f'(x) = 4x^3 \quad f'(-2) = 4 \cdot (-2)^3$$

$$= -32$$

CEVAP: C

CEVAP: B

15. $f(x) = \frac{x^e - x^\pi}{x} = \frac{x^e}{x} - \frac{x^\pi}{x} = x^{e-1} - x^{\pi-1}$

$$\lim_{x \rightarrow 1} \frac{f(x) - f(1)}{x-1} = f'(1)$$

$$f'(x) = (e-1) \cdot x^{e-2} - (\pi-1) \cdot x^{\pi-2}$$

$$f'(1) = e-1 - \pi+1 = e-\pi$$

CEVAP: C

CEVAP: E

16. $f(x) = (3x+2)^4$

$$\lim_{h \rightarrow 0} \frac{f(-1+h) - f(-1)}{h} = f'(-1)$$

$$f'(x) = 4 \cdot (3x+2)^3 \cdot 3$$

$$f'(-1) = 4 \cdot (-3+2)^3 \cdot 3 = -12$$

CEVAP: D

CEVAP: D



1. $f(x) = \sqrt{x^2 + 5} = (x^2 + 5)^{\frac{1}{2}}$

$$f'(x) = \frac{1}{2}(x^2 + 5)^{-\frac{1}{2}} \cdot 2x$$

$$f'(2) = \frac{1}{2}(4+5)^{-\frac{1}{2}} \cdot 4 = \frac{1}{2} \cdot (9)^{-\frac{1}{2}} \cdot 4^2 = \frac{2}{3}$$

2. $g(x) = [x^2 + (1+x)^3 - 2]^2$

$$g'(x) = 2[x^2 + (1+x)^3 - 2]^1 \cdot [2x + 3(1+x)^2 \cdot 1 - 0]$$

$$g'(-1) = 2[1+0-2][-2+0] = 4$$

3. $f(x) = \begin{cases} x^2 - ax & , x < 2 \\ x^3 + 2x + b & , x \geq 2 \end{cases}$

her noktada türevli ise

$x = 2$ de sürekli

ve

$x = 2$ de sağdan ve soldan türevler eşittir.

$$4 - 2a = 8 + 4 + b$$

$$2x - a = 3x^2 + 2$$

$$4 + 20 = 12 + b$$

$$4 - a = 12 + 2$$

$$b = 12$$

$$a = -10$$

$$a \cdot b = 12 \cdot (-10) = -120$$

CEVAP: A

4. $f(x) = \begin{cases} 2x + a & , x \leq -1 \\ x^2 + bx & , -1 < x \end{cases}$

her noktada türevlenebilir ise

$x = -1$ de sürekli

ve

$x = -1$ de sağdan
ve soldan türevleri eşittir.

$$-2 + a = 1 - b$$

$$2 = 2x + b$$

$$-2 + a = 1 - 4$$

$$2 = -2 + b$$

$$a = -1$$

$$b = 4$$

CEVAP: C

5. $f(x) = \underbrace{|x^2 - 3x + 1|}_{x=1 \text{ için } (-)} + \underbrace{|x^2 - 2x + 4|}_{x=1 \text{ için } (+)}$

$$f(x) = \cancel{x^2 + 3x - 1} + \cancel{x^2 - 2x + 4}$$

$$f(x) = x + 3 \Rightarrow f'(x) = 1 \Rightarrow f'(1) = 1$$

CEVAP: D

CEVAP: A

6. I. $f(x) = x - 2 \Rightarrow f'(x) = 1 \Rightarrow f'(2) = 1$

$$\text{II. } f(x) = |x - 2| \Rightarrow f'(2^+) = (x-2)' = 1 \\ \Rightarrow f'(2^-) = -(x+2)' = -1 \\ \Rightarrow f'(2) \text{ türevi yok.}$$

$$\text{III. } f(x) = \sqrt{x-2} \Rightarrow f'(x) = \frac{1}{2\sqrt{x-2}} \\ \Rightarrow f'(2) = \frac{1}{2\sqrt{0}} \text{ türevi yok.}$$

II ve III te türevi yok.

CEVAP: D

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7. $f(x) = \frac{6}{x^2 - 6x + 2a + 1}$

her x gerçek sayısı için türevlenebilir ise paydanın kökü yoktur.

$$\Delta < 0 \quad b^2 - 4ac < 0$$

$$(-6)^2 - 4 \cdot 1 \cdot (2a + 1) < 0$$

$$36 - 8a - 4 < 0 \Rightarrow 32 < 8a$$

$$\Rightarrow 4 < a$$

a'nın en küçük tam sayı değeri 5 dir.

CEVAP: C

8. $f(x) = \frac{2x+3}{x-3} + |x^2 - 4|$

$x = 3$ de payda sıfır olduğu için türevi yok.

$x^2 - 4 = 0 \Rightarrow x = 2$ ve $x = -2$ de sağdan ve soldan türevi eşit olmadığı için türevi yok.

3 noktada türeysizdir.

CEVAP: C

Türev

9. Grafikte $x = -1$ de limiti olmadığı için türevide yoktur.
 $x = -2$ ve $x = 1$ de kırılma olduğu için türevi yoktur.
 $x = 2$ de sürekli olmadığı için türevi yoktur.
4 noktada türevi yoktur.

CEVAP: D

10. $f(x) = \frac{|x-1|}{x^2-x-12}$
 $x-1=0 \Rightarrow x=1$ sağdan ve soldan türevleri eşit olmadığı için türevi yoktur.

$x^2-x-12=0$ $x=4$ ve $x=-3$ noktalarında payda
 $x \rightarrow -4=0$ sıfır olduğu için türevi yok.
 $x \rightarrow +3=0$

türevsiz olduğu küme $\{-3, 1, 4\}$

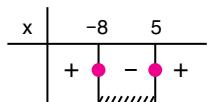
CEVAP: A

11. $f(x) = \sqrt{x^2+3x-40}$
 $x^2+3x-40 \leq 0$

$$x^2+3x-40=0$$

$$x \rightarrow +8=0 \quad x=-8 \quad x=5$$

$$x \rightarrow -5=0$$



$[-8, 5]$ x tam sayılar

$$= -8 - 7 - 6 - 5 - 4 - 3 - 2 - 1 + 0 + 1 + 2 + 3 + 4 + 5 \\ = -21$$

CEVAP: B

12. $f(3x+1) = x^2 - 4x + 7$
 $f'(3x+1).3 = 2x - 4 \quad 3x+1 = 7 \Rightarrow x=2$
 $f'(7).3 = 4 - 4 \quad f'(7) = 0$

CEVAP: E

13. $f(x) = x^2 + 5x + 2 \quad h(x) = \frac{f(x)}{3x+1}$
 $h(x) = \frac{x^2 + 5x + 2}{3x+1}$
 $h'(x) = \frac{(2x+5)(3x+1) - (x^2 + 5x + 2).3}{(3x+1)^2}$

$$h'(-1) = \frac{(3)(-2) - (1 - 5 + 2).3}{(-3+1)^2} \\ = \frac{-6 + 6}{4} = 0$$

CEVAP: C

14. $f(2x+5) = g(x^2 - x + 3)$
 $f'(2x+5) \cdot 2 = g'(x^2 - x + 3) \cdot (2x-1)$
 $2x+5=3 \Rightarrow 2x=-2 \Rightarrow x=-1$
 $f'(3).2 = g'(1+1+3).(-2-1)$
 $6.2 = g'(5).(-3) \Rightarrow g'(5) = -4$

CEVAP: A

15. $g(3) = 5 \quad g'(3) = 2 \quad f'(5) = -3$
 $(f \circ g)'(3) = f'(g(3)) \cdot g'(3)$
 $= f'(5) \cdot g'(3) = (-3) \cdot 2$
 $= -6$

CEVAP: E

16. $f\left(\frac{3}{2x-1}\right) = (4x-3)^2$
 $f'\left(\frac{3}{2x-1}\right) \cdot \frac{-3 \cdot 2}{(2x-1)^2} = 2 \cdot (4x-3) \cdot 4$
 $\frac{3}{2x-1} = 1 \Rightarrow x=2$
 $f'(1) \cdot \frac{-6}{9} = 2 \cdot 5 \cdot 4$
 $f'(1) = -60$

CEVAP: D



1. $y = 2u^2 + 3u$

$$u = t^2 - t - 2$$

$$t = 3x - 1$$

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dt} \cdot \frac{dt}{dx}$$

$$x = 0 \Rightarrow t = -1 \Rightarrow u = 0$$

$$\frac{dy}{dx} = (4u + 3) \cdot (2t - 1) \cdot 3 = 3 \cdot (-3) \cdot 3 = -27$$

3. $f(x) = 9x^8 - 8x^6 + 4x^4 - 2$

$$f'(x) = 9.8x^7 - 8.6x^5 + 4.4x^3$$

$$f''(x) = 9.8.7.x^6 - 8.6.5x^4 + 4.4.3x^2$$

⋮

$$f^{(8)}(x) = 9.8.7.6.5.4.3.2.1 = 9!$$

CEVAP: A

CEVAP: A

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2. $y = 3a^2 + a$

$$a = t^3 - 1$$

$$t = \ln x$$

$$\frac{dy}{dx} = \frac{dy}{da} \cdot \frac{da}{dt} \cdot \frac{dt}{dx}$$

$$x = e \Rightarrow t = 1 \Rightarrow a = 0$$

$$\frac{dy}{dx} = (6a + 1) \cdot 3t^2 \cdot \frac{1}{x} = 1 \cdot 3 \cdot \frac{1}{e} = \frac{3}{e}$$

4. $f(x) = (4x^2 - 4x + 1)^5 = ((2x - 1)^2)^5$
 $= (2x - 1)^{10}$

$$f'(x) = 10.(2x - 1)^9 \cdot 2$$

$$f''(x) = 10.9.(2x - 1)^8 \cdot 2^2$$

⋮

$$f^{(10)}(x) = 10.9.8 \dots 1.2^{10} = 2^{10} \cdot 10!$$

CEVAP: D

CEVAP: B

5. $f(3x - 2) = x^2 - 4x \quad g(2 - x) = 5 - x^2$
 $f'(3x - 2) \cdot 3 = 2x - 4 \quad g'(2 - x)(-1) = -2x$
 $f'(-11) = -\frac{10}{3} \quad g'(-2) = -11$
 $g'(-2) = 8$
 $(f \circ g)'(-2) = f'(g(-2)) \cdot g'(-2)$
 $= f'(-11) \cdot 8$
 $= \left(-\frac{10}{3}\right) \cdot 8 = -\frac{80}{3}$

CEVAP: C

7. $x < 0$
 $f(x^2 - 3x - 4) = \sqrt{x^4 + 3}$
 $f'(x^2 - 3x + 4) \cdot (2x - 3) = \frac{4x^3}{2\sqrt{x^4 + 3}}$
 $x^2 - 3x - 4 = 0 \quad x = 4$
 $x \rightarrow -4 = 0 \quad x = -1$
 $x \rightarrow +1 = 0$
 $f'(1 + 3 - 4)(-2 - 3) = \frac{-4}{2\sqrt{1+3}}$
 $f'(0) \cdot (-5) = \frac{-4}{4} \quad f'(0) = \frac{1}{5}$

CEVAP: A

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6. $g(2) = 3$
 $g'(2) = -2$
 $f(x \cdot g(x)) = x^2 - 3x + 5$
 $f'(x \cdot g(x)) [1 \cdot g(x) + x \cdot g'(x)] = 2x - 3$
 $f'(2 \cdot g(2)) [g(2) + 2 \cdot g'(2)] = 4 - 3$
 $f'(6) \cdot [3 - 4] = 1$
 $f'(6) = -1$

CEVAP: C

8. $P(x) - P'(x) = 2x^2 - 3x + 5$
 $P(x) = ax^2 + bx + c$
 $- P'(x) = 2ax + b$
 $2x^2 - 3x + 5 = ax^2 + (b - 2a)x + c - b$
 $a = 2 \quad b - 2a = -3 \Rightarrow b = 1 \quad c - b = 5 \Rightarrow c = 6$
 $P(x) = 2x^2 + x + 6 \quad P(2) = 8 + 2 + 6 = 16$

CEVAP: B

9. $P(x)$ polinomu $(x - 1)^2$ ile tam bölünüyorsa

$$x - 1 = 0 \Rightarrow x = 1$$

$$P(1) = 0 \quad P'(1) = 0$$

$$P(x) = 3x^3 + (b+1)x^2 - ax + 7$$

$$P'(x) = 9x^2 + (b+1).2x - a$$

$$3 + b + 1 - a + 7 = 0$$

$$-b - a = -11$$

$$+ 2b - a = -11$$

$$\hline b = 0 \quad a = 11$$

$$11. \quad f(x) = ax^2 - \frac{a}{x} \quad f'(x) = 2ax + \frac{a}{x^2}$$

$$g(x) = x^3 + 5x + 4 \quad g'(x) = 3x^2 + 5$$

$$(f+g)'(-1) = (f-g)'(1)$$

$$f'(-1) + g'(-1) = f'(1) - g'(1)$$

$$-2a + a + 3 + 5 = 2a + a - 3 - 5$$

$$-a + 8 = 3a - 8$$

$$16 = 4a$$

$$a = 4$$

CEVAP: A

CEVAP: D

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10. $g(x^2 + 1) - f\left(-\frac{x}{3}\right) = x^2 - 2x + \frac{1}{x}$

$$g'(x^2 + 1).2x - f'\left(-\frac{x}{3}\right)\left(-\frac{1}{3}\right) = 2x - 2 - \frac{1}{x^2}$$

$x = 3$ için

$$g'(10).6 + \frac{f'(-1)}{3} = 6 - 2 - \frac{1}{9}$$

$$\frac{18g'(10) + f'(-1)}{3} = \frac{35}{9}$$

$$18.g'(10) + f'(-1) = \frac{35}{3}$$

CEVAP: E

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12. $f(x) = x^2 - 3x$

$$g(x) = 2x^2 - m\sqrt{x}$$

$$(f.g)'(4) = -7$$

$$f'(4).g(4) + f(4).g'(4) = -7$$

$$f'(x) = 2x - 3 \Rightarrow f'(4) = 5$$

$$f(4) = 16 - 12 = 4$$

$$g'(x) = 4x - \frac{m}{2\sqrt{x}} \Rightarrow g'(4) = 16 - \frac{m}{4}$$

$$g(4) = 32 - 2m$$

$$5(32 - 2m) + 4\left(16 - \frac{m}{4}\right) = -7$$

$$160 - 10m + 64 - m = -7$$

$$224 - 11m = -7$$

$$231 = 11m$$

$$m = 21$$

CEVAP: C

13. $f(x) = \frac{\sqrt[3]{x} \cdot \sqrt{x}}{x}$

$$f(x) = \frac{x^{\frac{1}{3}} \cdot x^{\frac{1}{2}}}{x^1} = x^{\frac{1}{3} + \frac{1}{2} - 1}$$

$$= x^{\frac{2}{6} + \frac{3}{6} - \frac{6}{6}} = x^{-\frac{1}{6}}$$

$$\frac{df(x)}{dx} = -\frac{1}{6}x^{-\frac{1}{6}-1} = \frac{-x^{-\frac{7}{6}}}{6}$$

$$\frac{d^2f(x)}{dx^2} = \frac{7}{36} \cdot x^{-\frac{13}{6}}$$

$$x = 1 \text{ için } \frac{d^2f(x)}{dx^2} = \frac{7}{36}$$

14. $f'(x) = 2x^3 - 4x - 7$
 $f(2) = 7$

$$\lim_{x \rightarrow 2} \frac{f(x) - 7}{x - 2} = f'(2)$$

$$f'(2) = 2 \cdot 2^3 - 4 \cdot 2 - 7 = 16 - 8 - 7 = 1$$

CEVAP: D

15. $\sqrt{x} \cdot \frac{d(x^2 \cdot \sqrt{x})}{dx} = \sqrt{x} \cdot \frac{d(x^2 \cdot x^{\frac{1}{2}})}{dx}$

$$= \sqrt{x} \cdot \frac{d(x^{\frac{5}{2}})}{dx} = \sqrt{x} \cdot \frac{5}{2} \cdot x^{\frac{5}{2}-1}$$

$$= \sqrt{x} \cdot \frac{5}{2} \cdot x^{\frac{3}{2}} = \sqrt{x} \cdot \frac{5}{2} \cdot x \sqrt{x}$$

$$= \frac{5}{2}x^2 \Big|_{x=2} = \frac{5}{2} \cdot 2^2 = 10$$

CEVAP: B

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16. $f(x) = x^3 - 5$
 $g(x) = x^2 + x + 3$

$$\left(\frac{f}{g}\right)'(-2) = \frac{f'(-2).g(-2) - f(-2).g'(-2)}{g^2(-2)}$$

$$f'(x) = 3x^2 \Rightarrow f'(-2) = 12$$

$$f(-2) = (-2)^3 - 5 = -13$$

$$g'(x) = 2x + 1 \Rightarrow g'(-2) = -3$$

$$g(-2) = (-2)^2 + (-2) + 3 = 4 - 2 + 3 = 5$$

$$\frac{12.5 - (-13).(-3)}{5^2} = \frac{60 - 39}{25} = \frac{21}{25}$$

CEVAP: B



$$1. \quad f(x) = \frac{x^2 + 5}{2x - 3}$$

$$\begin{aligned} f(x) &= (x^2 + 5)(2x - 3) + x + 1 \\ f'(x) &= 2x(2x - 3) + (x^2 + 5).2 + 1 \\ f'(-3) &= (-6).(-9) + (14).2 + 1 \\ &= 54 + 28 + 1 = 83 \end{aligned}$$

CEVAP: D

$$2. \quad f(x) = \frac{1}{g(x)-2} \quad g'(2) = -1 \quad g(2) = 3$$

$$\begin{aligned} f'(x) &= \frac{0.(g(x)-2) - 1.g'(x)}{(g(x)-2)^2} \\ f'(2) &= \frac{-g'(2)}{(g(2)-2)^2} = \frac{1}{1} = 1 \end{aligned}$$

CEVAP: D

$$3. \quad f(x) = \begin{cases} x^2, & x \text{ irrasyonel ise} \\ \sqrt{x}, & x \text{ rasyonel ise} \end{cases}$$

$$\begin{aligned} f'\left(\frac{1}{\sqrt{2}}\right) &= 2x = \frac{2}{\sqrt{2}} \\ f'\left(\frac{1}{2}\right) &= \frac{1}{2\sqrt{x}} = \frac{\sqrt{2}}{2} \\ (f \circ f)' \left(\frac{1}{2}\right) &= f'\left(f\left(\frac{1}{2}\right)\right) \cdot f'\left(\frac{1}{2}\right) \\ &= f'\left(\frac{1}{\sqrt{2}}\right) \cdot f'\left(\frac{1}{2}\right) = \frac{2}{\sqrt{2}} \cdot \frac{\sqrt{2}}{2} = 1 \end{aligned}$$

$$4. \quad gof(x) = 4x^2 + 12x + 13$$

$$f^{-1}(x) = \frac{x-3}{2} \quad f(x) = 2x+3$$

$$f'(x) = 2$$

$$f'\left(\frac{1}{2}\right) = 2$$

$$f\left(\frac{1}{2}\right) = 4$$

$$g'(f(x)).f'(x) = 8x + 12$$

$$g'\left(f\left(\frac{1}{2}\right)\right).f'\left(\frac{1}{2}\right) = 8 \cdot \frac{1}{2} + 12$$

$$g'(4) \cdot 2 = 16$$

$$g'(4) = 8$$

CEVAP: C

CEVAP: C

$$5. \quad f(x) = ax^3 - 12x^2 + c$$

$$f'(x) = 3ax^2 - 24x$$

$$f'(-2) = 12a + 48 = 24$$

$$12a + 48 = 24$$

$$12a = -24$$

$$a = -2$$

CEVAP: B

$$6. \quad f(x) = (a-2)x^3 + (a+1)x^2$$

$f'(-x) = -f'(x)$ ise $f(x)$ fonksiyonu çift fonksiyondur.

Yani $a = 2$ olur.

$$f(x) = 3x^2$$

$$f'(x) = 6x$$

$$f'(2) = 12$$

CEVAP: A

$$7. \quad f(2x-3) + f(x+2) = 4x+5$$

$$f'(2x-3).2 + f'(x+2) = 4$$

$$x = 5 \text{ için } f'(7).2 + f'(7) = 4$$

$$3f'(7) = 4$$

$$f'(7) = \frac{4}{3}$$

CEVAP: C

$$8. \quad f(x) = \left(2 + (3+x^2)^2\right)^3$$

$$f'(x) = 3\left(2 + (3+x^2)^2\right)^2 \cdot 2(3+x^2) \cdot 2x$$

$$f'(1) = 3(2+4^2)^2 \cdot 2 \cdot (4) \cdot 2$$

$$= 3 \cdot 16^2 \cdot 16 = 3 \cdot 3^4 \cdot 2^2 \cdot 2^4$$

$$= 3^5 \cdot 2^6$$

CEVAP: E

9. $f(x) = 2x^2 - 5x$ $f'(x) = 4x - 5$
 $g(x) = x + 1$ $g'(x) = 1$
 $(f \circ g)'(-2) = f'(g(-2)) \cdot g'(-2)$
 $= f'(-1) \cdot 1 = -9$
 $g(-2) = -1$
 $f'(-1) = -9$
 $g'(-2) = 1$

10. $(f \circ g)(x) = \frac{3 - 2g(x)}{3g(x) + 2}$
 $g(x) = x$
 $f(x) = \frac{3 - 2x}{3x + 2} \Rightarrow f^{-1}(x) = \frac{3 - 2x}{3x + 2}$
 $(f^{-1})'(x) = \frac{(-2)(3x + 2) - (3 - 2x) \cdot 3}{(3x + 2)^2}$
 $(f^{-1})'(-1) = \frac{(-2)(-1) - (5) \cdot 3}{(-1)^2}$
 $= 2 - 15$
 $= -13$

11. $f(x) = (x - a)^2 \cdot (x + 1)$

$$\begin{aligned} f'(x) &= 2(x-a)(x+1) + (x-a)^2 \\ \lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a} &= 5 \\ \lim_{x \rightarrow a} \frac{(x-a)^2 \cdot (x+1) - 2(x-a)(x+1) - (x-a)^2}{x-a} &= 0 \\ \lim_{x \rightarrow a} \frac{(x-a)[(x-a)(x+1) - 2(x+1) - (x-a)]}{x-a} &= 0 \\ 0 \cdot (x+1) - 2(a+1) - 0 &= 5 \\ -2a - 2 &= 5 \\ -2a &= 7 \\ a &= \frac{-7}{2} \end{aligned}$$

12. $f(x) = x^2 \cdot g(x)$ $g'(3) = 1$
 $g(3) = -2$
 $f'(x) = 2x \cdot g(x) + x^2 \cdot g'(x)$
 $f'(3) = 6 \cdot g(3) + 9 \cdot g'(3)$
 $= 6 \cdot (-2) + 9 \cdot 1$
 $= -12 + 9 = -3$

CEVAP: A

13. $f(x) = x^2 - 3x + 5$ $f(2) = 3$
 $f'(x) = 2x - 3$ $f'(2) = 1$
 $g(x) = x^3 - x^2 - 1$ $g(2) = 3$
 $g'(x) = 3x^2 - 2x$ $g'(2) = 8$
 $(f \circ g)'(2) = f'(2) \cdot g(2) + f(2) \cdot g'(2)$
 $= 1 \cdot 3 + 3 \cdot 8 = 3 + 24 = 27$

CEVAP: E

14. $y = f(x)$

$$\begin{aligned} \frac{y+2x}{3x-y} - \frac{x}{2} &= 1 \\ \frac{y+2x}{3x-y} &= 1 + \frac{x}{2} = \frac{2+x}{2} \\ 2y + 4x &= 6x - 2y + 3x^2 - xy \\ 4y + xy &= 2x + 3x^2 \\ y &= \frac{2x + 3x^2}{(4+x)^2} \\ f'(-1) &= \frac{(2+6x)(4+x) - (2x+3x^2) \cdot 1}{(4+x)^2} \\ f'(-1) &= \frac{(-4)(3) - (1)}{3^2} = \frac{-13}{9} \end{aligned}$$

CEVAP: B

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15. $f(3x - 1) = g(x^2 - 1)$
 $f'(3x - 1) \cdot 3 = g'(x^2 - 1) \cdot 2x$
 $x = 2$ için $f'(5) \cdot 3 = g'(3) \cdot 4$
 $g(2x + 1) = x^2 - x - 11$
 $g'(2x + 1) \cdot 2 = 2x - 1$

$$\begin{aligned} x = 1 \text{ için } g'(3) \cdot 2 &= 1 \quad g'(3) = \frac{1}{2} \\ f'(5) \cdot 3 &= \frac{1}{2} \cdot 4 \\ f'(5) &= \frac{2}{3} \end{aligned}$$

CEVAP: B

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16. $y = u^3 - u^2$ $x = \frac{1}{2}$
 $u = t^2 + 2t + 1$ $t = 0$
 $t = 2x - 1$ $u = 1$
 $\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dt} \cdot \frac{dt}{dx}$
 $= (3u^2 - 2u) \cdot (2t + 2) \cdot 2$
 $= (3 - 2) \cdot (0 + 2) \cdot 2 = 4$

CEVAP: A

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1. $f(x) = \frac{d}{dx}(x^4 - 4x^3 + 3\sqrt{2}) = 4x^3 - 12x^2$

$$\lim_{x \rightarrow 1} \frac{f'(x) + 12}{x - 1} = \lim_{x \rightarrow 1} \frac{f'(x) - f'(1)}{x - 1}$$

$$= f''(1)$$

$$f'(x) = 12x^2 - 24x$$

$$f''(x) = 24x - 24$$

$$f''(1) = 0 \text{ bulunur.}$$

CEVAP: C

2. $f(x) = 1 + 2x + 3x^2 + 4x^3 + 5x^4 + \dots + 15x^{14}$
 $f'(x) = 2 + 3.2x + 4.3x^2 + 5.4x^3 + \dots + 15.14.x^{13}$
 $f'(1) = 1.2 + 2.3 + 3.4 + \dots + 14.15$
 $= \frac{14.15.16}{3} = 1120 \text{ bulunur.}$

CEVAP: B

3. $P(x) = \frac{d}{dx}((2x+1)^3 \cdot (x^2+1)^4)$
 $P(x) = 3(2x+1)^2 \cdot 2 \cdot (x^2+1)^4 + (2x+1)^3 \cdot 4(x^2+1)^3 \cdot 2x$
 $P(-1) = 3 \cdot (-1)^2 \cdot 2 \cdot 2^4 + (-1)^3 \cdot 4 \cdot 2^3 \cdot (-2)$
 $= 96 + 64 = 160 \text{ bulunur.}$

CEVAP: A

4. $P(x) = ax^2 + bx + c, P'(x) = 2ax + b$
 $P(P'(x)) = a(2ax + b)^2 + b(2ax + b) + c$
 $= a(4a^2x^2 + 4abx + b^2) + 2abx + b^2 + c$
 $= 4a^3x^2 + (4a^2b + 2ab)x + ab^2 + b^2 + c$
 $P(P'(x)) = 4x^2 + 18x + 15 \text{ ise}$
 $4a^3 = 4, 4a^2b + 2ab = 18, ab^2 + b^2 + c = 15$
 $\Rightarrow a = 1, 6b = 18, 18 + c = 15$
 $b = 3, c = -3$
 $P(x) = x^2 + 3x - 3 \text{ ise } P(1) = 1 \text{ bulunur.}$

CEVAP: E

5. $\frac{d}{dx}(x^3y + 2xy^2) + \frac{d}{dy}(3xy - x^2y + 2x)$
 $= 3x^2y + 2y^2 + 3x - x^2$
 $x = -1, y = 2 \text{ yazılırsa,}$
 $6 + 8 - 3 - 1 = 10 \text{ bulunur.}$

CEVAP: D

6. $(gof)(3x - 5) = x^2 + 4x + 1$
 $(gof)'(3x - 5) = 2x + 4$
 $g'(f(3x - 5)).f'(3x - 5).3 = 2x + 4$
 $x = 2 \text{ için}$
 $g'(f(1)).f'(1).3 = 8$
 $g'(5).3.3 = 8$
 $g'(5) = \frac{8}{9} \text{ bulunur.}$

CEVAP: B

7. $y = (z^2 + 8)^{\frac{1}{3}}$
 $z = (x^2 + x + 1)^{-1}, x = -1 \text{ için } z = 1$
 $\frac{dy}{dx} = \frac{dy}{dz} \cdot \frac{dz}{dx}$
 $= \frac{1}{3\sqrt[3]{(z^2 + 8)^2}} \cdot 2z \cdot \frac{-1}{(x^2 + x + 1)^2} \cdot (2x + 1)$
 $x = -1, z = 1 \text{ yazılırsa}$
 $\frac{dy}{dx} = \frac{1}{3\sqrt[3]{81}} \cdot 2 \cdot \frac{1}{1}$
 $= \frac{2}{9\sqrt[3]{3}} = \frac{2\sqrt[3]{9}}{27} \text{ bulunur.}$
 $(\sqrt[3]{9})$

CEVAP: E

8. $f(x) = x^{\frac{1}{2}} + x^{-1}$
 $\frac{dy}{dx} = \frac{1}{2}x^{-\frac{1}{2}} - x^{-2}$
 $\frac{d^2y}{dx^2} = -\frac{1}{4}x^{-\frac{3}{2}} + 2x^{-3}$
 $= -\frac{1}{4x\sqrt{x}} + \frac{2}{x^3}$
 $x = 4 \text{ için } -\frac{1}{4.4\sqrt{4}} + \frac{2}{4^3} = -\frac{1}{32} + \frac{1}{32} = 0 \text{ bulunur.}$

CEVAP: C

Türev

9. $x = -2$ iken $f(-2) > 2$ olduğundan

$$g(x) = x^3 - x$$

$$g'(x) = 3x^2 - 1, g'(-2) = 12 - 1 = 11$$

$x = 1$ iken $f(1) = 2$ olduğundan

$$g(x) = \sqrt{x} + 4$$

$$g'(x) = \frac{1}{2\sqrt{x}}, g'(1) = \frac{1}{2}$$

$$g'(-2) + g'(1) = 11 + \frac{1}{2} = \frac{23}{2} \text{ bulunur.}$$

CEVAP: D

10. $f(1) > g(1)$ olduğundan

$$h(x) = h^2(2 - x), h(1) = h^2(1)$$

$$h(1) = 0 \text{ veya } h(1) = 1$$

$$h'(x) = 2h(2 - x).h'(2 - x).(-1)$$

$$x = 1 \text{ için } h'(1) = 2h(1).h'(1).(-1)$$

$$h'(1).(1 + 2h(1)) = 0$$

$$\Rightarrow h'(1) = 0 \text{ bulunur.}$$

12. $(fogoh)'(x) = f'(goh(x)).g'(h(x)).h'(x)$

$$f'(x) = 2x, g'(x) = h'(2x).2 + 1, h'(x) = 3$$

$$(fogoh)'(1) = f'(\underbrace{goh(1)}_{g(2)=h(4)+2}).g'(\underbrace{h(1)}_{2}).h'(1)$$

$$= 13$$

$$= f'(13).g'(2).3$$

$$= 26.7.3$$

$$= 546$$

CEVAP: D

13. • $f(x), x = 2$ de süreklidir.

$$\lim_{x \rightarrow 2^-} f(x) = \lim_{x \rightarrow 2^+} f(x) = f(2)$$

$$4a + 2a + 1 = 2b - 3a$$

$$[9a - 2b = -1] \dots (1)$$

• $\underbrace{f'(2^-)}_{y = ax^2 + ax + 1} = \underbrace{f'(2^+)}_{y = bx - 3a}$

$$y' = 2ax + a \quad y' = b$$

$$\Rightarrow 4a + a = b$$

$$\Rightarrow [b = 5a] \dots (2)$$

(1) ve (2) ortak çözülürse

$$9a - 10a = -1$$

$$a = 1, b = 5$$

$$f(x) = \begin{cases} x^2 + x + 1, & x < 2 \\ 5x - 3, & x \geq 2 \end{cases}$$

$$f'(x) = \begin{cases} 2x + 1, & x < 2 \\ 5, & x \geq 2 \end{cases}$$

$$f'(2) = 5 \text{ bulunur.}$$

CEVAP: C

11. $x^2 - 5x + 2x \neq 0$ olmalı

$$\Delta < 0, 25 - 8k < 0$$

$$\frac{25}{8} < k$$

$$k_{\min} = 4 \text{ bulunur.}$$

CEVAP: C

- 14.

$$f(x^2 - 4x) = x^3 + 1$$

$$f'(x^2 - 4x).(2x - 4) = 3x^2$$

$$f'(x^2 - 4x) = \frac{3x^2}{2x - 4}$$

$x = 2$ için tanımsızdır.

$f'(4 - 8) = f'(-4)$ tanımsız olur.

CEVAP: A



1. Yol denkleminin 1. türevi hız denklemini verir.

$$S(t) = t^3 - 4t^2 + 2t + 8$$

$$S'(t) = 3t^2 - 8t + 2$$

$$S'(3) = 27 - 24 + 2 = 5$$

CEVAP: C

2. Yol denkleminin 2. türevi ivme denklemini verir.

$$S(t) = t^3 - 2t^2 + 7t + 4$$

$$S'(t) = 3t^2 - 4t + 7$$

$$S''(t) = 6t - 4 \Rightarrow S''(2) = 12 - 4 = 8$$

CEVAP: C

3. x' — anlık hız

$$f'(t) = 3t^2 + 6t + 6$$

$$g'(t) = 3t^2 + 8t - 2$$

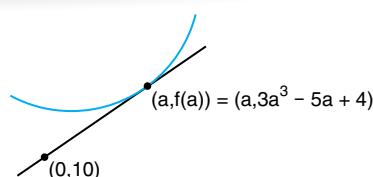
$$3t^2 + 6t + 6 = 3t^2 + 8t - 2$$

$$8 = 2t$$

$$t = 4 \text{ bulunur.}$$

CEVAP: D

- 4.



$$m_T = f'(a) = 9a^2 - 5$$

$$\frac{3a^3 - 5a + 4 - 10}{a} = 9a^2 - 5$$

$$3a^3 - 5a - 6 = 9a^3 - 5a$$

$$-6 = 6a^3$$

$$-1 = a^3$$

$$-1 = a$$

$$m_T = 9 - 5 = 4$$

(0,10) noktasından geçen ve eğimi 4 olan teğet doğrusunun denklemi

$$\frac{y - 10}{x} = 4 \Rightarrow y = 4x + 10 \quad \text{bulunur.}$$

CEVAP: E

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i5. $f(x) = x^3 - 8x + 4 \quad f'(x) = 3x^2 - 8$

$$x = 2 \text{ için } y = f(2) = 8 - 16 + 4 = -4$$

$$m_T = f'(2) = 12 - 8 = 4$$

$$y - y_0 = m_T(x - x_0)$$

$$y + 4 = 4 \cdot (x - 2)$$

$$y = 4x - 12$$

CEVAP: E

6. $y = x^2 - ax + b$, $x = -1$ noktasındaki teğet,

$$y = 2x - 1 \text{ ise}$$

$$\text{eğim} = 2 \quad \text{nokta} \Rightarrow y = -3$$

$$y' = 2x - a \quad 1 + a + b = -3$$

$$2 = -2 - a \quad 1 - 4 + b = -3$$

$$a = -4 \quad b = 0$$

$$a \cdot b = (-4) \cdot 0 = 0$$

CEVAP: C

Türev

7. $y = x^2 - 2x - 2$

$$y' = 2x - 2$$

$x = a$ noktasındaki teğeti

$$y = a^2 - 2a - 2$$

$$M_T = y' = 2a - 2$$

$$y - y_0 = M_T(x - x_0)$$

$$y - (a^2 - 2a - 2) = (2a - 2)(x - a)$$

(3, 0) noktasından geçiyorsa

$$0 - a^2 + 2a + 2 = (2a - 2)(3 - a)$$

$$-a^2 + 2a + 2 = 6a - 6 - 2a^2 + 2a$$

$$a^2 - 6a + 8 = 0$$

$$a \rightarrow -4 = 0 \quad a = 4$$

$$a \rightarrow -2 = 0 \quad a = 2$$

$$x = a = 2 \text{ için } y = 2^2 - 2.2 - 2 = -2 \Rightarrow (2, -2)$$

CEVAP: A

8. x eksenine平行 teğet ise eğim sıfırdır.

$$f(x) = x^3 + 6x^2 - 15x + 5$$

$$f'(x) = 3x^2 + 12x - 15$$

$$3(x^2 + 4x - 5) = 0$$

$$x \rightarrow +5 = 0 \quad x = -5$$

$$x \rightarrow -1 = 0 \quad x = 1$$

$$f(-5) = (-5)^3 + 6.(-5)^2 - 15.(-5) + 5$$

$$= -125 + 150 + 75 + 5$$

$$= 105$$

$$f(1) = 1 + 6 - 15 + 5 = -3$$

Teğetler arası uzaklık

$$= 105 - (-3) = 108$$

10. $y = 4x - 1$ ve $f(x) = x^4 + 2$ $P(a, b)$

noktasında teğet ise eğimleri eşittir.

$$y' = 4 \quad g'(x) = 4x^3$$

$$4x^3 = 4$$

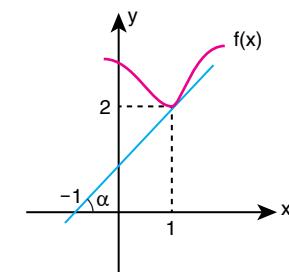
$$x^3 = 1$$

$$x = 1 = a$$

$$y = 4.1 - 1 = 3 = b$$

$$a.b = 3.1 = 3$$

CEVAP: E



$$x = 1 \text{ için } f(1) = 2$$

$$\tan \alpha = \frac{2}{2} = 1$$

$$M_T = f'(1) = 1$$

$$g(x) = (3x + 2).f(x)$$

$$g'(x) = 3.f(x) + (3x + 2).f'(x)$$

$$g'(1) = 3.f(1) + 5.f'(1)$$

$$= 3.2 + 5.1 = 11$$

CEVAP: E

9. $f(x) = x^3 - ax + b$

$$x = -2 \quad y = 3 \text{ denklemi sağlar.}$$

$$3 = -8 + 2a + b \Rightarrow 2a + b = 11$$

$$f'(x) = 3x^2 - a$$

$$x = -2 \text{ deki teğet eğimi } 5$$

$$12 - a = 5 \Rightarrow a = 7$$

$$14 + b = 11 \Rightarrow b = -3$$

CEVAP: E

12. (1, 5) ve (-2, 1) noktasından geçen doğru eğimi = $f'(x)$

$$M_T = \frac{y_2 - y_1}{x_2 - x_1}$$

$$f'(1) = \frac{1 - 5}{-2 - 1} = \frac{-4}{-3} = \frac{4}{3}$$

CEVAP: B

CEVAP: B



1. Doğrular dik ise eğimleri çarpımı (-1) dir.

$$y = x^2 + ax + 5 \quad y = -\frac{1}{3}x + 1$$

$$y' = 2x + a \quad y' = -\frac{1}{3}$$

$x = -2$ noktasındaki eğim $y' = -4 + a$

$$(-4 + a) \cdot \left(-\frac{1}{3}\right) = -1$$

$$-4 + a = 3 \Rightarrow a = 7$$

CEVAP: B

2. $y^2 = 16x \Rightarrow y = 4\sqrt{x}$

Teğet eğimi 2 olan nokta

$$y' = \frac{4}{2\sqrt{x}} = \frac{2}{\sqrt{x}} = 2 \quad x = 1 \text{ dir.}$$

$$y^2 = 16 \cdot 1 = 16 \Rightarrow y = 4 \text{ dür.}$$

$A(x, y) = (1, 4)$ toplam 5 tır.

3. $y - 32x + 27 = 0 \Rightarrow y = 32x - 27$

$f(x) = x^4 + 21$ Teğet ise eğimleri eşittir.

$$f'(x) = 4x^3 \quad y' = 32$$

$$4x^3 = 32 \Rightarrow x^3 = 8 \Rightarrow x = 2$$

$$f(2) = 2^4 + 21 = 37 = y$$

$P(a, b) = P(2, 37)$ çarpımı 74 tür.

CEVAP: C
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4. $A(a, b)$ noktasındaki teğet denklemini yazalım.

$$y = x^2 + 1 \Rightarrow y' = 2x \Rightarrow y' = 2a$$

$$y - y_0 = M_T(x - x_0)$$

$$y - (a^2 + 1) = 2a(x - a)$$

Orjinden $(0, 0)$ geçerse

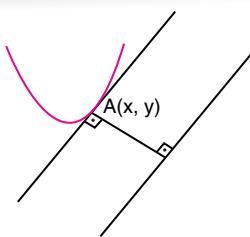
$$-a^2 - 1 = 2a(-a)$$

$$-a^2 - 1 = -2a^2 \Rightarrow a^2 = 1 \Rightarrow a = 1 \quad b = 1 + 1 = 2$$

$$A(a,b) = (1,2)$$

CEVAP: A

5.



en yakın nokta paralel oldukları için eğimleri eşittir.

$$y = x^2 - 7x + 11$$

$$y = -3x + 1$$

$$2x - 7 = -3$$

$$2x = 4$$

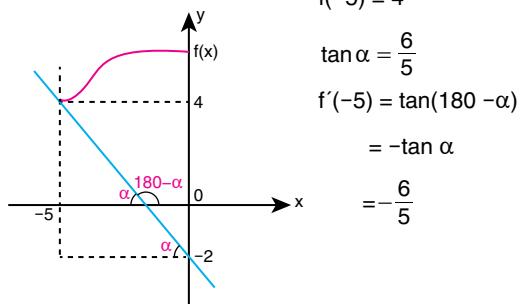
$$x = 2$$

$$y = 2^2 - 7 \cdot 2 + 11 = 4 - 14 + 11 = 1$$

en yakın nokta $(2, 1)$ koordinatları toplamı = 3

CEVAP: B

6.



$$f(-5) = 4$$

$$\tan \alpha = \frac{6}{5}$$

$$f'(-5) = \tan(180 - \alpha)$$

$$= -\tan \alpha$$

$$= -\frac{6}{5}$$

$$g(x) = (2x + 4)f(x)$$

$$g'(x) = 2.f(x) + (2x + 4).f'(x)$$

$$g'(-5) = 2.f(-5) + (-10 + 4).f'(-5)$$

$$g'(-5) = 2.f(-5) + (-10 + 4).f'(-5)$$

$$= 2 \cdot 4 + (-6) \cdot \frac{-6}{5} = 8 + \frac{36}{5} = \frac{76}{5}$$

CEVAP: B

7. $y = x^3 - 5x$ eğrisine çizilen teğet $y = 7x - 5$ doğrusuna paralel ise eğimleri eşittir.

$$y' = 3x^2 - 5 \quad y' = 7$$

$$3x^2 - 5 = 7 \Rightarrow 3x^2 = 12 \Rightarrow x^2 = 4 \Rightarrow x = \mp 2$$

CEVAP: B

8. $y = \sqrt{x} + \frac{8}{2+\sqrt{x}} - 3$

Nokta

$$x = 4 \quad y = \sqrt{4} + \frac{8}{2+\sqrt{4}} - 3 = 2 + \frac{8}{4} - 3 = 1$$

Eğim

$$y' = \frac{1}{2\sqrt{x}} + \frac{0 \cdot (2+\sqrt{x}) - 8 \cdot \frac{1}{2\sqrt{x}}}{(2+\sqrt{x})^2}$$

$$y' = \frac{1}{2\sqrt{4}} + \frac{-8 \cdot \frac{1}{2\sqrt{4}}}{(2+\sqrt{4})^2} = \frac{1}{4} + \frac{-\frac{8}{4}}{(4)^2} = \frac{1}{4} - \frac{1}{8} = \frac{1}{8}$$

$$y - y_0 = M_T(x - x_0) \Rightarrow y - 1 = \frac{1}{8}(x - 4)$$

y eksenini kesmesi için $x = 0$ olmalı

$$y - 1 = \frac{1}{8}(0 - 4) \Rightarrow y - 1 = \frac{-1}{2}$$

$$\Rightarrow y = \frac{-1}{2} + 1$$

$$\Rightarrow y = \frac{1}{2}$$

CEVAP: B

9. $y = (x+2)(x-2)^2$

Nokta $x = 1 \quad y = (1+2)(1-2)^2 = 3$

Eğim $y' = 1 \cdot (x-2)^2 + (x+2) \cdot 2(x-2)$

$$y' = 1 + 3 \cdot 2 \cdot (-1) = -5$$

$$M_T \cdot M_N = -1 \Rightarrow -5 \cdot M_N = -1 \Rightarrow M_N = \frac{1}{5}$$

$$y - y_0 = M_N(x - x_0)$$

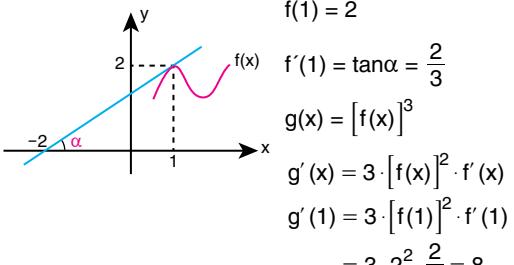
$$y - 3 = \frac{1}{5}(x - 1)$$

x eksenini kesmesi için $y = 0$

$$0 - 3 = \frac{1}{5}(x - 1) \Rightarrow -15 = x - 1 \Rightarrow x = -14$$

CEVAP: C

10.



CEVAP: C

11. eğim = $\tan 135^\circ = -1$

$$y = x^2 - 4x + 1 \Rightarrow y' = 2x - 4$$

$$2x - 4 = -1 \Rightarrow 2x = 3 \Rightarrow x = \frac{3}{2}$$

CEVAP: B

12. Nokta

$$x = 1 \quad y = 1^3 = 1 \quad y = x^3$$

Eğim

$$y' = 3x^2 \Rightarrow y' = 3$$

$$y - y_0 = M_T(x - x_0)$$

$$y - 1 = 3(x - 1) \Rightarrow y = 3x - 2$$

fonksiyonlar kesiştiğine göre

$$x^3 = 3x - 2$$

$$x^3 - 1 = 3x - 3$$

$$(x-1)(x^2+x+1) = 3(x-1)$$

$$x^2 + x + 1 = 3 \Rightarrow x^2 + x - 2 = 0$$

$$x \rightarrow +2 = 0 \quad x = 1$$

$$x \rightarrow -1 = 0 \quad x = -2$$

$$x = -2 \text{ için } y = (-2)^3 = -8 \Rightarrow A(-2, -8)$$

Koordinatları çarpımı $= (-2) \cdot (-8) = 16$

CEVAP: E

13. x eksenini kestiği noktalardan çizilen teğetler dik ise eğimler çarpımı (-1) dir.

$$y = x^2 - ax + 3 \quad x \text{ eksenini kestiği noktalar } x_1 \text{ ve } x_2 \text{ dir.}$$

$$x_1 + x_2 = a \quad x_1 \cdot x_2 = 3$$

$$y' = 2x - a \quad (2x_1 - a)(2x_2 - a) = -1$$

$$4x_1x_2 - 2x_1a - 2x_2a + a^2 = -1$$

$$4 \cdot 3 - 2a(x_1 + x_2) + a^2 = -1$$

$$-a^2 = -13 \Rightarrow a = \sqrt{13}$$

CEVAP: D



1. $f(x) = x^2 - 4x + 5$ $f'(x) > 0$ artandır.

$$\begin{aligned}f'(x) &= 2x - 4 \Rightarrow 2x - 4 > 0 \\&\Rightarrow 2x > 4 \Rightarrow x > 2\end{aligned}$$

$(2, \infty)$ artan

CEVAP: E

2. $f(x) = x^3 - 3x^2 - 9x + 2$ $f'(x) < 0$ azalan

$$f'(x) = 3x^2 - 6x - 9 \quad 3(x^2 - 2x - 3) < 0$$

$$\begin{aligned}x^2 - 2x - 3 &= 0 \\x \rightarrow -3 &= 0 \quad x = 3 \\x \rightarrow +1 &= 0 \quad x = -1\end{aligned}$$

x	-1	3
	+ () - () +	

$(-1, 3)$ azalan

CEVAP: A

3. $f(x) = x^3 + 6x^2 + (m+3)x + 2$

$$f'(x) = 3x^2 + 12x + m + 3$$

daima artan ise $\Delta < 0$ dır.

$$\Delta = b^2 - 4ac$$

$$12^2 - 4 \cdot 3 \cdot (m+3) < 0$$

$$144 - 12m - 36 < 0 \Rightarrow 108 < 12m$$

$$\Rightarrow 9 < m$$

m en az 10 dur.

CEVAP: C

4. $f(x) = \frac{ax-5}{2x-3}$ $f'(x) < 0$ azalan

$$f'(x) = \frac{a.(2x-3) - (ax-5).2}{(2x-3)^2}$$

$$= \frac{2ax - 3a - 2ax + 10}{(2x-3)^2} = \frac{-3a + 10}{(2x-3)^2}$$

$$\frac{-3a + 10}{(2x-3)^2} < 0 \Rightarrow -3a + 10 < 0 \Rightarrow 10 < 3a$$

$$\Rightarrow \frac{10}{3} < a$$

a en az 4 tür.

CEVAP: C

5. $f'(x) > 0$ artandır.

A) $y = 5$ ise $y' = 0$ sabit

B) $y = x^2$ ise $y' = 2x$ daima artan değil

C) $y = \frac{1}{x} = x^{-1}$ ise $y' = -x^{-2} = \frac{-1}{x^2}$ azalan

D) $y = x^3$ ise $y' = 3x^2$ artan

E) $y = -x + 4$ ise $y' = -1$ azalan

CEVAP: D

6. $a < x < b$ negatif tanımlı $\Rightarrow f(x) < 0$

artan $\Rightarrow f'(x) > 0$

A) $f^2(x)$ Türevi $\rightarrow 2.f(x).f'(x) = 2.(-).(+) = -$ azalan

B) $f(x)$ Türevi $\rightarrow f'(x) = +$ artan

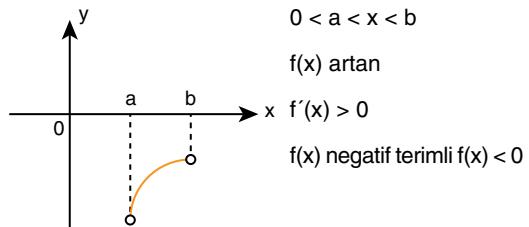
C) $-f(x)$ Türevi $\rightarrow -f'(x) = -$ azalan

D) $\frac{1}{f(x)}$ Türevi $\rightarrow \frac{-f'(x)}{f^2(x)} = \frac{-}{+} = -$ azalan

E) $x - f(x)$ Türevi $\rightarrow 1 - f'(x)$ artan veya azalan değil

CEVAP: B

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A) $f(x^2)$ Türevi $\rightarrow 2x.f'(x^2) \rightarrow .+$ $\rightarrow +$ artan

B) $f^2(x)$ Türevi $\rightarrow 2.f(x).f'(x) \rightarrow -.+$ $\rightarrow -$ azalan

C) $f^3(x)$ Türevi $\rightarrow 3.f^2(x).f'(x) \rightarrow .+$ $\rightarrow +$ artan

D) $f(x^3)$ Türevi $\rightarrow 3x^2.f'(x^3) \rightarrow .+$ $\rightarrow +$ artan

E) $\frac{-1}{f(x)}$ Türevi $\rightarrow \frac{f'(x)}{f^2(x)} \rightarrow \frac{+}{+} \rightarrow +$ artan

CEVAP: B

8. $f(x) = x^3 + 3x^2 - 4x - 1$

$$f'(x) = 3x^2 + 6x - 4 \text{ artan ise } f''(x) > 0$$

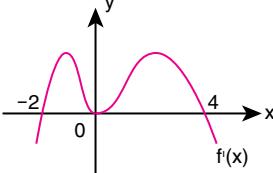
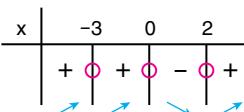
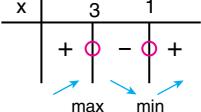
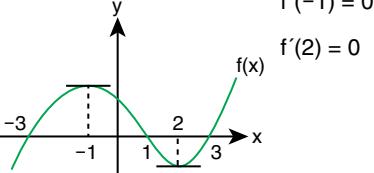
$$f''(x) = 6x + 6 \quad 6x + 6 > 0 \Rightarrow 6x > -6$$

$$\Rightarrow x > -1$$

artan olduğu aralık $(-1, \infty)$

CEVAP: C

Türev

- 9.** 
 f(x) fonksiyonu artan ise $f'(x) > 0$
- $$x = \{-1, 1, 2, 3\} \text{ x ler toplamı } = 5$$
- CEVAP: D**
- 10.** $f'(x) = (x-2)x(x+3)^2$
- $$x-2=0 \quad x=0 \quad x+3=0$$
- $$x=2$$
- 
- azalan olduğu aralık $(0, 2)$
- CEVAP: D**
- 11.** Ekstremum nokta $f'(x) = 0$
- $$f'(1) = 0$$
- $$f(x) = \frac{x^2 + ax}{x-2}$$
- $$f'(x) = \frac{(2x+a)(x-2) - (x^2 + ax) \cdot 1}{(x-2)^2}$$
- $$= \frac{(2+a)(-1) - (1+a)}{(-1)^2} = 0$$
- $$-2-a-1-a=0 \Rightarrow 2a=-3 \Rightarrow a=\frac{-3}{2}$$
- CEVAP: A**
- 12.** $f(x) = x^3 - x^2 - x + 4$
- $$f'(x) = 3x^2 - 2x - 1$$
- $$3x^2 - 2x - 1 = 0 \quad x = \frac{-1}{3}$$
- $$3x \rightarrow +1 = 0 \quad x = 1$$
- $$x \rightarrow -1 = 0 \quad x = 1$$
- 
- $x = 1$ ise $y = 1 - 1 - 1 + 4 = 3$
- $(1, 3)$ yerel minimum noktasıdır.
- CEVAP: C**
- 13.** 
 $f'(-1) = 0$
 $f'(2) = 0$
- $(-\infty, -1) \rightarrow f(x) \text{ artan} \rightarrow f'(x) > 0$
 $(-1, 2) \rightarrow f(x) \text{ azalan} \rightarrow f'(x) < 0$
 $(2, \infty) \rightarrow f(x) \text{ artan} \rightarrow f'(x) > 0$
- CEVAP: C**
- 14.** $y = -x^2 + 8x + m$ $y' = 0$ ekstremum noktadır.
 $y' = -2x + 8 = 0$ $(4, 5)$ maksimum noktası ise
 $-2x = -8$
 $x = 4$
 $5 = -16 + 32 + m$
 $m = -11$
- CEVAP: A**
- 15.** $f(x) = -2x^3 + 6kx^2 + 7x + 7$
 $f'(x)$ fonksiyonunun $x = 2$ de yerel ekstremumu varsa
 $f''(2) = 0 \quad f'(x) = -6x^2 + 12kx + 7$
 $f''(x) = -12x + 12k$
 $-24 + 12k = 0$
 $k = 2$
- CEVAP: D**
- 16.** $f(x) = \frac{x^3}{3} - mx^2 + nx + 7$
 $f'(x) = x^2 - 2mx + n$
 azalan olduğu aralık $(-2, 1)$ ise -2 ve 1 uç noktalarıdır.
 $f'(-2) = 0 \quad f(1) = 0$
 $4 + 4m + n = 0 \quad 1 + 2 \cdot \frac{1}{2} + n = 0$
 $- / \quad 1 - 2m + n = 0$
 $3 + 6m = 0 \quad n = -2$
 $m = -\frac{1}{2}$
 $m \cdot n = \left(-\frac{1}{2}\right) \cdot (-2) = 1$
- CEVAP: C**



1. $f(x) = x^3 - 3x^2 - 7x + 8$

dönüm noktası $f''(x) = 0$

$$f'(x) = 3x^2 - 6x - 7$$

$$f''(x) = 6x - 6 \Rightarrow 6x - 6 = 0 \Rightarrow x = 1$$

$$f(1) = 1 - 3 - 7 + 8 = -1$$

Dönüm noktası = (1, -1)

CEVAP: A

2. $x = -1$ dönüm noktası $f''(-1) = 0$

$x = -1$ teğet eğimi 2 ise $f'(-1) = 2$

$$f(x) = x^3 + bx^2 + ax + 3$$

$$f'(x) = 3x^2 + 2bx + a \Rightarrow 3 - 2b + a = 2$$

$$f''(x) = 6x + 2b \Rightarrow -6 + 2b = 0$$

$$b = 3$$

$$a = 5$$

CEVAP: D

3. $x = 2$ de yerel ekstremum $f'(2) = 0$

$$x = \frac{-1}{24} \text{ de dönüm noktası } f''\left(\frac{-1}{24}\right) = 0$$

$$f(x) = 4x^3 - mx^2 + nx - 1$$

$$f'(x) = 12x^2 - 2mx + n$$

$$48 - 4m + n = 0$$

$$f''(x) = 24x - 2m$$

$$24 \cdot \left(\frac{-1}{24}\right) - 2m = 0 \quad m = \frac{-1}{2}$$

$$48 - \frac{2}{4} \cdot \left(\frac{-1}{2}\right) + n$$

$$48 + 2 + n = 0$$

$$n = -50$$

$$m \cdot n = \frac{-1}{2} \cdot (-50)^{25} = 25$$

CEVAP: E

4. $f(x) = (x - 2)^3 + 3x^2 - 6x + 1$

$$f'(x) = 3(x - 2)^2 + 6x - 6$$

$$f''(x) = 6(x - 2) + 6$$

$f''(x) = 0$ dönüm noktası

$$6(x - 2) + 6 = 0 \quad x = 1$$

Nokta

$$x = 1 \quad f(1) = (-1)^3 + 3 - 6 + 1 = -3 = y$$

Eğim

$$f'(1) = 3(-1)^2 + 6 - 6 = 3$$

$y - y_0 = M_T(x - x_0)$ Teğet denklemi

$$y + 3 = 3(x - 1)$$

y eksenini kesmesi için $x = 0$

$$y + 3 = -3 \Rightarrow y = -6$$

CEVAP: D

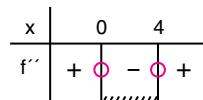
5. $f(x) = x^4 - 8x^3 - 8x + 3$

$$f'(x) = 4x^3 - 24x^2 - 8$$

$$f''(x) = 12x^2 - 48x$$

$$12x(x - 4) = 0$$

$$x = 0 \quad x = 4 \quad f''(x) < 0 \text{ (konkav)}$$

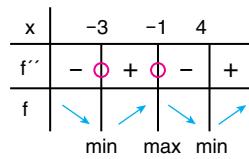


konkav aralık (0, 4)

CEVAP: B

6. Grafikte $f'(x) = 0$ ekstremum noktalardır.

$$x = -3, x = -1, x = 4$$

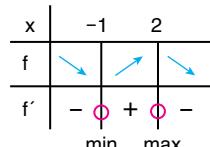


$x = 4$ yerel min. noktadır.

CEVAP: E

7. Grafikte tepe noktalar ekstremum noktalardır.

$$x = -1, x = 2$$



$$f'\left(\frac{3}{2}\right) \cdot f'\left(-\frac{1}{2}\right) > 0$$

CEVAP: C

8. $f(x) = x^4 + 4x^3 + ax^2 - 6$

daima konveks ise $f''(x) > 0$ ve
 $\Delta \leq 0$ dır.

$$f'(x) = 4x^3 + 12x^2 + 2ax$$

$$f''(x) = 12x^2 + 24x + 2a$$

$$b^2 - 4ac \leq 0$$

$$24^2 - 4 \cdot 12 \cdot 2 \cdot a \leq 0$$

$$6 \leq a \rightarrow [6, \infty)$$

9. $f(x) = x^3 + 3x^2 + ax + 3$

$$f'(x) = 3x^2 + 6x + a$$

$$f''(x) = 6x + 6$$

dönüm noktası $f''(x) = 0$

$$6x + 6 = 0 \Rightarrow x = -1$$

$x = -1$ deki teğet eğimi -3

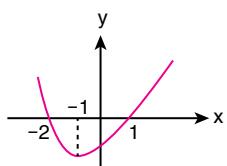
$$f'(-1) = -3$$

$$3(-1)^2 + 6(-1) + a = -3$$

$$3 - 6 + a = -3 \Rightarrow a = 0$$

10. Grafikte $x = -2$ ve $x = 1$ ekstremum noktalardır.

x	-2	1
f		
f'	+	-



11. $f(x) = x^3 - 2x^2 - x + 2$

$$= x^2(x - 2) - (x - 2)$$

$$= (x^2 - 1)(x - 2) = (x - 1)(x + 1)(x - 2)$$

Grafik x ekseni $x = 1$ ve $x = -1$ ve $x = 2$ de keser ve $x = 0$ için $y = 2$ olmalı.

CEVAP: E

12. (a, b) aralığında negatif değerli $f(x) < 0$ artan fonksiyon ise $f'(x) > 0$

$$A) x^2 \cdot f(x) \rightarrow 2x \cdot f(x) + x^2 \cdot f'(x)$$

daima artan veya azalan denemez.

$$B) f^3(x) \Rightarrow 3 \cdot f^2(x) \cdot f'(x) \Rightarrow +.+$$

⇒ artandır.

$$C) \frac{1}{f(x)} \Rightarrow \frac{-f'(x)}{f^2(x)} \Leftarrow \frac{-}{+} \Rightarrow \text{azalan}$$

$$D) f^2(x) \Rightarrow 2 \cdot f(x) \cdot f'(x) \Rightarrow -.+$$

⇒ azalan

$$E) \frac{1}{f^3(x)} \Rightarrow \frac{-3 \cdot f^2(x) \cdot f'(x)}{f^6(x)} \Rightarrow \frac{-}{+}$$

⇒ azalan

CEVAP: B

13. $f(x) = x^2 - 6x + 5 \quad [-2, 5]$ aralığı

$$f'(x) = 2x - 6 \quad 2x - 6 = 0 \quad x = 3$$

$$f(-2) = 4 + 12 + 5 = 21$$

$$f(3) = 9 - 18 + 5 = -4$$

$$f(5) = 25 - 30 + 5 = 0$$

max değer = 21

min değer = -4

Toplam = 17

CEVAP: B

14. $f'(x) = 0$ yapan ve grafikin yön değiştirdiği noktalar ekstremum noktalardır.

Grafikte $x = 2$ ve $x = 5$ ekstremum noktalardır.

$$2 \cdot 5 = 10 \text{ olur.}$$

CEVAP: B

15. $y = (x + 1) \cdot (x - 3)^2$

x ekseni (-1) de keser.

$x = 3$ çift katlı kök x eksenine teğet ve 3 ten büyük değerler için fonksiyon pozitiftir.

CEVAP: C

16. $x = -2$ denklemin tek katlı kökü $(x + 2)$ ise A ve B şıkları olmaz. $x = 1$ denklemin çift katlı kökü $(x - 1)^2$ ise C şıkları olmaz. $x = 0$ için $y = 3$ olmalı E şıkları olmaz.

CEVAP: D



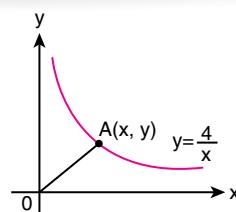
Türev

Çözüm 10

1. $f(x) = x^2 + 8x + 11$ $f'(x) = 0$
 $f'(x) = 2x + 8$ $2x + 8 = 0 \Rightarrow x = -4$
 $f(-4) = 16 - 32 + 11 = -5$ min değer

CEVAP: C

4.



Orjine uzaklık

$$= \sqrt{x^2 + \frac{16}{x^2}}$$

$$\left(\sqrt{x^2 + 16 \cdot x^{-2}}\right)' = 0$$

$$\frac{2x - 32x^{-3}}{2\sqrt{x^2 + 16x^{-2}}} = 0$$

$$2x = 32x^{-3}$$

$$x^4 = 16$$

$$x = 2$$

$$\text{Uzaklık} = \sqrt{4 + \frac{16}{4}} = \sqrt{8} = 2\sqrt{2}$$

CEVAP: B

2. $x + y = 13 \Rightarrow y = 13 - x$

$$x \cdot y = x(13 - x) = 13x - x^2$$

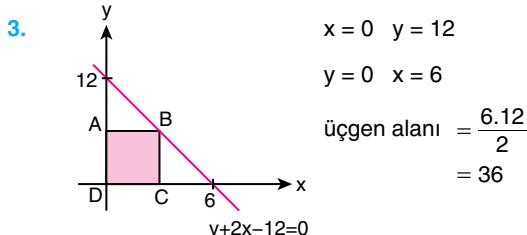
$$(13x - x^2)' = 13 - 2x = 0 \quad x = \frac{13}{2}$$

$$y = \frac{13}{2}$$

$$x \cdot y = \frac{13}{2} \cdot \frac{13}{2} = \frac{169}{4} \text{ en fazla}$$

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Dikdörtgenin alanı $= \frac{\text{üçgenin alanı}}{2}$
 $= \frac{36}{2} = 18$

CEVAP: B

5. $f(x) = x^3 - 3x^2 - 9x + 7 \quad [-5, 5]$ aralığı

$$f'(x) = 3x^2 - 6x - 9$$

$$3(x^2 - 2x - 3) = 0$$

$$x \rightarrow -3 = 0 \quad x = 3$$

$$x \rightarrow +1 = 0 \quad x = -1$$

$$f(3) = 27 - 27 - 27 + 7 = -20$$

$$f(-1) = -1 - 3 + 9 + 7 = 12 \text{ max değer}$$

CEVAP: C

Türev

6. $x + y = 8 \Rightarrow y = 8 - x$

$$\begin{aligned}x^2 + 2xy - 5 &= x^2 + 2x(8 - x) - 5 \\&= x^2 + 16x - 2x^2 - 5 = -x^2 + 16x - 5\end{aligned}$$

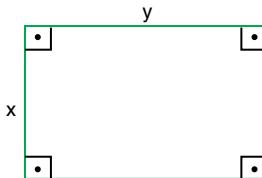
$$-2x + 16 = 0 \rightarrow \text{Türevi} = 0$$

$$x = 8$$

$$\begin{aligned}\text{En büyük değer, } &= -8^2 + 16 \cdot 8 - 5 \\&= -64 + 128 - 5 \\&= 59\end{aligned}$$

CEVAP: B

8.



$$\text{Alan} = x \cdot y = 72$$

$$y = \frac{72}{x}$$

$$\text{Çevre} = 2(x + y)$$

$$\text{Çevre} = 2\left(x + \frac{72}{x}\right)$$

$$\begin{aligned}\left(x + \frac{72}{x}\right)' &= 0 \Rightarrow 1 - \frac{72}{x^2} = 0 \\&\Rightarrow x^2 = 72 \Rightarrow x = 6\sqrt{2}\end{aligned}$$

$$\text{Çevre} = 2\left(6\sqrt{2} + \frac{72}{6\sqrt{2}}\right)$$

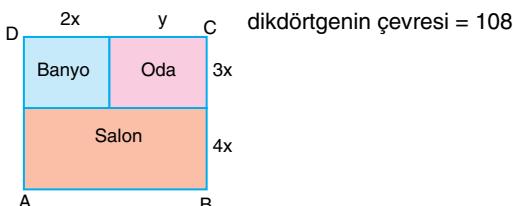
$$= 2 \cdot \frac{144^{24}}{6\sqrt{2}} = \frac{48}{\sqrt{2}} = \frac{48^{24}\sqrt{2}}{12} = 24\sqrt{2}$$

CEVAP: C

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7.



dikdörtgenin çevresi = 108

$$2(2x + y + 7x) = 108 \Rightarrow y = 54 - 9x$$

Oda alanı = $3x(54 - 9x) \rightarrow \text{Türevi} = 0$

$$3(54 - 9x) + 3x \cdot (-9) = 0$$

$$162 - 27x - 27x = 0$$

$$162 = 54x \Rightarrow x = 3$$

CEVAP: A

9. $y = x^2 - 7x + 12$ parabol üzerinde A(x, y) noktası koordinatları toplamı: $x + y = x + x^2 - 7x + 12$

$$= x^2 - 6x + 12$$

Türevi = 0

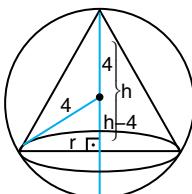
$$(x + x^2 - 7x + 12)' = 0'$$

$$2x - 6 = 0 \Rightarrow x = 3$$

CEVAP: D

10. $\text{hız} = -x^2 + 20x$ Türevi = 0
 $-2x + 20 = 0$
 $x = 10$
 en çok = $-100 + 200$
 $= 100$

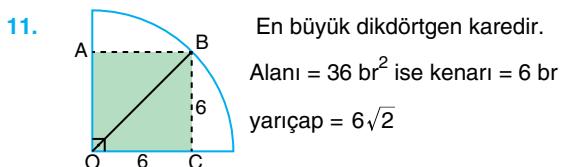
13. $V = \frac{1}{3} \cdot \pi r^2 \cdot h$



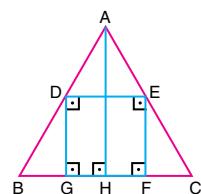
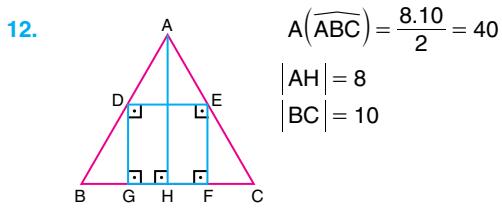
$$\begin{aligned}(h-4)^2 + r^2 &= 16 \\ r^2 &= 16 - (h-4)^2 \\ V &= \frac{1}{3} \pi (16 - (h-4)^2) \cdot h \\ V' &= \frac{\pi}{3} [-2(h-4) \cdot h + 16 - (h-4)^2]\end{aligned}$$

$$\begin{aligned}-2h^2 + 8h + 16 - h^2 + 8h - 16 &= 0 \\ -3h^2 + 16h &= 0 \quad h = 0 \quad \text{ve} \quad h = \frac{16}{3}\end{aligned}$$

CEVAP: E



CEVAP: B

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$$\begin{aligned}\text{Dikdörtgenin alanı} &= \frac{\text{Üçgenin alanı}}{2} \\ &= \frac{40}{2} = 20\end{aligned}$$

CEVAP: C

14. $x^2 - (3a - 2)x - a + 2 = 0$

$$x_1 + x_2 = \frac{-b}{a} = 3a - 2$$

$$x_1 x_2 = \frac{c}{a} = -a + 2$$

$$\begin{aligned}x_1^2 + x_2^2 &= (x_1 + x_2)^2 - 2x_1 x_2 \\ &= (3a - 2)^2 - 2 \cdot (-a + 2) \\ &= 9a^2 - 12a + 4 + 2a - 4 \\ &= 9a^2 - 10a\end{aligned}$$

$$\text{Türevi} = 0$$

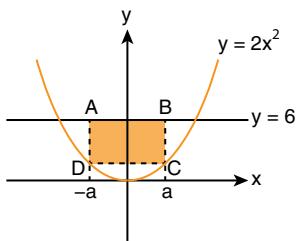
$$18a - 10 = 0$$

$$a = \frac{10}{18} = \frac{5}{9}$$

$$\begin{aligned}x_1^2 + x_2^2 &= 9a^2 - 10a = 9 \cdot \frac{25}{81} - 10 \cdot \frac{5}{9} \\ &= \frac{25}{9} - \frac{50}{9} = -\frac{25}{9}\end{aligned}$$

CEVAP: D

15.



$$\text{Alan} = 2a \cdot (6 - 2a^2) \rightarrow \text{Türevi} = 0$$

$$2 \cdot (6 - 2a^2) + 2a \cdot (-4a) = 0$$

$$12 - 4a^2 - 8a^2 = 0$$

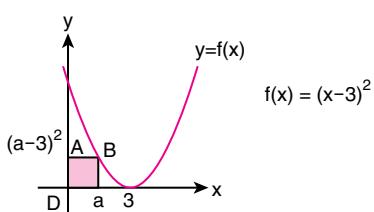
$$12 = 12a^2 \Rightarrow a^2 = 1 \rightarrow a = 1$$

CEVAP: B

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16.



$$\text{ABCD alanı} = a \cdot (a - 3)^2$$

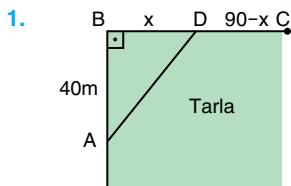
$$\text{Türevi} = 0$$

$$1 \cdot (a - 3)^2 + a \cdot 2(a - 3) = 0$$

$$(a - 3)(a - 3 + 2a) = 0$$

$$a = 3 \quad a = 1 \quad y = (1 - 3)^2 = 4$$

CEVAP: E



$$AD = \sqrt{40^2 + x^2}$$

$$\text{süre} = \frac{\sqrt{40^2 + x^2}}{3} + \frac{90-x}{5}$$

$$\frac{1}{3} \cdot \frac{2x}{\sqrt{40^2 + x^2}} - \frac{1}{5} = 0 \quad \text{Türev} = 0$$

$$\frac{x}{3\sqrt{40^2 + x^2}} = \frac{1}{5} \Rightarrow 5x = 3\sqrt{40^2 + x^2}$$

$$25x^2 = 9(40^2 + x^2)$$

$$25x^2 = 9 \cdot 40^2 + 9x^2 \Rightarrow 16x^2 = 9 \cdot 40^2$$

$$\Rightarrow 4x = 3.40$$

$$\Rightarrow x = 30$$

$$\text{Zaman} = \frac{\text{Yol}}{\text{Hız}}$$

3. Kâr = Satış Fiyatı – Maliyet
 $Kâr = x^2 - 53x - x = x^2 - 54x$
 $2x - 54 = 0 \Rightarrow 2x = 54 \Rightarrow x = 27$

CEVAP: C

CEVAP: E

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2. $A = 3x + 5 \quad B = 8 - 2x$

A. $B = (3x + 5)(8 - 2x)$

3. $(8 - 2x) + (3x + 5) \cdot (-2) = 0$

$24 - 6x - 6x - 10 = 0$

$14 = 12x \Rightarrow x = \frac{7}{6}$

CEVAP: A

4. $y = x^2 + 2x + 3$ parabolünün $(-1, 0)$ noktasına en yakın noktası A (x, y) olsun

$$\text{Uzaklık} = \sqrt{(x+1)^2 + (y-0)^2}$$

$$\text{Türev} = 0$$

$$= \sqrt{(x+1)^2 + (x^2 + 2x + 3)^2}$$

$$\frac{2(x+1) + 2(x^2 + 2x + 3) \cdot (2x+2)}{2\sqrt{(x+1)^2 + (x^2 + 2x + 3)^2}} = 0$$

$$2(x+1)(1 + 2x^2 + 4x + 6) = 0$$

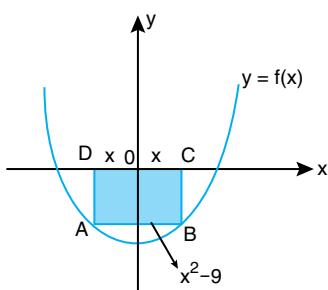
$$x = -1 \quad \Downarrow$$

Kök yok

$$y = (-1)^2 + 2(-1) + 3 = 1 - 2 + 3 = 2$$

CEVAP: A

5.



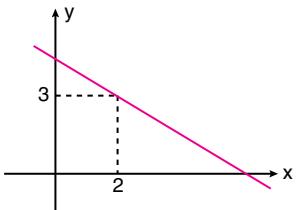
$$\text{Alan} = 2x(x^2 - 9) = 2x^3 - 18x$$

$$6x^2 - 18 = 0 \Rightarrow x^2 = 3 \Rightarrow x = \sqrt{3}$$

$$\begin{aligned}\text{Alan} &= 2.(-\sqrt{3})^3 - 18.(-\sqrt{3}) \\ &= -6\sqrt{3} + 18\sqrt{3} = 12\sqrt{3}\end{aligned}$$

CEVAP: D

7.



$$\text{dikdörtgen alanı} = \frac{\text{Üçgen alanı}}{2}$$

$$2.3 = \frac{\text{Üçgen alanı}}{2}$$

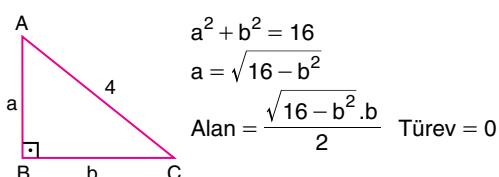
$$\text{Üçgen alanı} = 12$$

CEVAP: C

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6.



$$a^2 + b^2 = 16$$

$$a = \sqrt{16 - b^2}$$

$$\text{Alan} = \frac{\sqrt{16 - b^2} \cdot b}{2}$$

$$8. \quad x^2 - (n+2)x - n^2 - n + 3 = 0$$

$$x_1 x_2 = \frac{c}{a} = -n^2 - n + 3$$

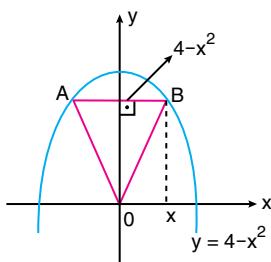
$$(-n^2 - n + 3)' = 0 \Rightarrow -2n - 1 = 0 \Rightarrow n = \frac{-1}{2}$$

$$x_1 + x_2 = \frac{-b}{a} = n + 2 = \frac{-1}{2} + 2 = \frac{3}{2}$$

CEVAP: B

CEVAP: A

9.



$$\text{Alan} = \frac{x \cdot (4 - x^2)}{2}$$

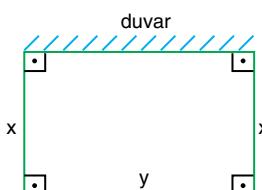
$$= \frac{4x - x^3}{2}$$

$$\left(\frac{4x - x^3}{2} \right)' = 0 \Rightarrow \frac{4 - 3x^2}{2} = 0$$

$$3x^2 = 4 \Rightarrow x^2 = \frac{4}{3} \Rightarrow x = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

CEVAP: B

10.



3 sıra tel 360 m ise

1 sıra tel 120 m dir.

$$2x + y = 120$$

$$y = 120 - 2x$$

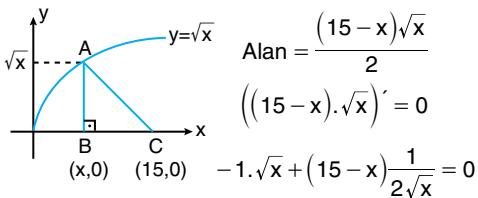
$$\text{Alan} = x \cdot y = x(120 - 2x)' \Rightarrow 120x - 2x^2$$

$$(120x - 2x^2)' = 0 \Rightarrow 120 - 4x = 0 \Rightarrow x = 30$$

$$\text{Alan} = 120 \cdot 30 - 2 \cdot 30^2 = 3600 - 1800 = 1800$$

CEVAP: C

11.



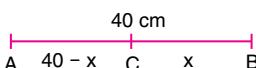
$$\sqrt{x} = \frac{15 - x}{2\sqrt{x}} \Rightarrow 2x = 15 - x \Rightarrow x = 5$$

$$\text{Alan} = \frac{10\sqrt{5}}{2} = 5\sqrt{5}$$

CEVAP: E

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12.



$$6|AC|^2 + 4|CB|^2 = 6(40 - x)^2 + 4x^2$$

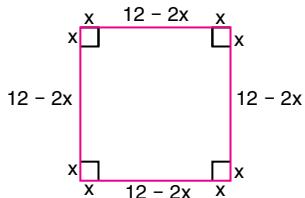
$$6 \cdot 2(40 - x) \cdot (-1) + 8x = 0$$

$$480 - 12x = 8x \Rightarrow 20x = 480 \Rightarrow x = 24$$

Türev = 0

CEVAP: C

13.



$$\text{Hacim} = (12 - 2x)^2 \cdot x \quad \text{Türev} = 0$$

$$2 \cdot (12 - 2x) \cdot (-2) \cdot x + (12 - 2x)^2 = 0 \\ (12 - 2x)(-4x + 12 - 2x) = 0$$

$$x = 6 \text{ ve } x = 2$$

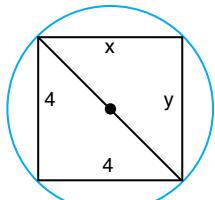
$$\text{Hacim} = (12 - 4)^2 \cdot 2 = 128$$

CEVAP: B

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14.



$$x^2 + y^2 = 64$$

$$y = \sqrt{64 - x^2}$$

$$\text{Alan} = x \cdot y$$

$$\text{Alan} = x \cdot \sqrt{64 - x^2}$$

$$\text{Türev} = 0$$

$$1 \sqrt{64 - x^2} + x \cdot \frac{-2x}{2\sqrt{64 - x^2}} = 0$$

$$\sqrt{64 - x^2} = \frac{x^2}{\sqrt{64 - x^2}} \Rightarrow x^2 = 64 - x^2$$

$$\Rightarrow 2x^2 = 64$$

$$\Rightarrow x^2 = 32 \Rightarrow x = 4\sqrt{2}$$

$$\text{Alan} = 4\sqrt{2}\sqrt{64 - 32} = 4\sqrt{2} \cdot 4\sqrt{2} = 32$$

CEVAP: A



1. $f(x) = x^4 - mx^2 + mx + 7$

$$f'(1) = -2, f'(x) = 4x^3 - 2mx + m$$

$$f'(1) = 4 - 2m + m = -2$$

$$6 = m$$

$$f'(x) = 4x^3 - 12x + 6$$

$$f''(x) = 12x^2 - 12$$

$f''(1) = 0$ bulunur.

CEVAP: C

3. $f(x) = x^2 - 6x + k$ parabolünün x eksenini kestiği noktalar x_1 ve x_2 olsun.

Bu noktalardan x_1 de teğet olan doğrunun eğimi $\tan(-45^\circ) = -1$ dir.

$$f'(x_1) = -1, f'(x) = 2x - 6$$

$$2x_1 - 6 = -1$$

$$x_1 = \frac{5}{2}$$

$$x_1 + x_2 = 6 \Rightarrow \frac{5}{2} + x_2 = 6$$

$$\Rightarrow x_2 = \frac{7}{2}$$

$$x_1 \cdot x_2 = k \Rightarrow \frac{5}{2} \cdot \frac{7}{2} = k$$

$$\Rightarrow k = \frac{35}{4} \text{ bulunur.}$$

CEVAP: C

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2. $f(x) = (x^2 + 1).g(x), f'(-2) = 4, g(-2) = -3$

$$f'(x) = 2x.g(x) + (x^2 + 1).g'(x)$$

$$x = -2 \text{ için } f'(-2) = -4g(-2) + 5.g'(-2)$$

$$4 = 12 + 5.g'(-2)$$

$$g'(-2) = -\frac{8}{5} \text{ dir.}$$

$(-2, -3)$ noktasından geçen ve eğimi $-\frac{8}{5}$ olan teğet doğrusunun denklemi:

$$\frac{y+3}{x+2} = -\frac{8}{5}$$

$$5y + 15 = -8x - 16$$

$5y + 8x + 31 = 0$ bulunur.

CEVAP: B

4. $f'(x) = 2x + 4$

x	-2
$f'(x)$	- o +
$f(x)$	

$$f(-2) = 4 - 8 - 2 = -6$$

$(-2, -6)$ yerel minimum noktasıdır.

$$g'(x) = -2x + 3$$

x	3/2
$g'(x)$	+ o -
$g(x)$	

$$g\left(\frac{3}{2}\right) = -\frac{9}{4} + \frac{9}{2} + p$$

$$= p + \frac{9}{4}$$

$$\left(\frac{3}{2}, p + \frac{9}{4}\right) \text{ yerel maksimum noktasıdır.}$$

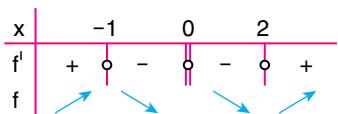
Yerel maksimum ve yerel minimum noktalardan geçen teğetlerin eğimleri 0 dır. Bu teğetler çıkışık ise yerel minimum ve yerel maksimum noktaların ordinatları aynı olmalı.

$$f(-2) = g\left(\frac{3}{2}\right) \Rightarrow -6 = p + \frac{9}{4}$$

$$\Rightarrow p = -\frac{33}{4} \text{ bulunur.}$$

CEVAP: A

5. $f'(x) = (x - 2).(x + 1).x^4$



- I. $f(x)$, $(-1, 2)$ aralığında artandır. (Yanlış)
- II. 2 tane yerel ekstremum var. (Doğru)
- III. x eksenini sadece 1 noktada kesiyor olabilir. (Doğru)

CEVAP: D

7. $f(x) = x^3 - 6x^2 + 9x + k$

$$\begin{aligned}f'(x) &= 3x^2 - 12x + 9 \\&= 3(x - 1)(x - 3)\end{aligned}$$

Ekstremum noktalar $x = 1$ ve $x = 3$

Ekstremum değerler $f(1)$ ve $f(3)$

$$f(1) = 2f(3) \text{ ya da } f(3) = 2f(1)$$

$$\Rightarrow 1 - 6 + 9 + k = 2(27 - 54 + 27 + k)$$

$$4 + k = 2k$$

$$4 = k$$

$$27 - 54 + 27 + k = 2(1 - 6 + 9 + k)$$

$$k = 8 + 2k$$

$$-8 = k$$

k nin alacağı değerler toplamı $4 - 8 = -4$ bulunur.

CEVAP: A

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6. Grafiklere göre,

$$g(x) > 0, g'(x) < 0, f(x) < 0, f'(x) > 0$$

- I. $f(x)$ artandır.

II. $(f \circ g)'(x) = \underbrace{f'(g(x))}_{+} \cdot \underbrace{g'(x)}_{-} < 0$

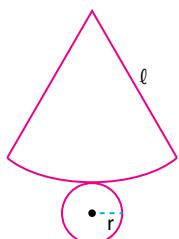
$(f \circ g)(x)$ azalandır.

III. $\left(\sqrt{g(x)} + \frac{1}{f(x)}\right)' = \underbrace{\frac{g'(x)}{2\sqrt{g(x)}}}_{\substack{- \\ +}} - \underbrace{\frac{f'(x)}{f^2(x)}}_{\substack{+ \\ +}} < 0$

$\sqrt{g(x)} + \frac{1}{f(x)}$ azalandır.

CEVAP: D

8.



Koninin yüzey alanı

$$\pi rl + \pi r^2 = 4\pi$$

$$l = \frac{4-r^2}{r} = \frac{4}{r} - r$$

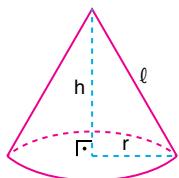
$$h^2 = l^2 - r^2$$

$$= \left(\frac{4}{r} - r\right)^2 - r^2$$

$$= \frac{16}{r^2} - 8 + r^2 - r^2$$

$$= \frac{16}{r^2} - 8$$

$$h = \sqrt{\frac{16}{r^2} - 8}$$



$$V = \frac{\pi r^2 \cdot h}{3} = \frac{\pi}{3} \cdot r^2 \cdot \sqrt{\frac{16}{r^2} - 8}$$

$$V = \frac{\pi}{3} \cdot \sqrt{r^4 \left(\frac{16}{r^2} - 8\right)}$$

$$V = \frac{\pi}{3} \cdot \sqrt{16r^2 - 8r^4}$$

$$V' = 0 \Rightarrow (16r^2 - 8r^4)' = 0$$

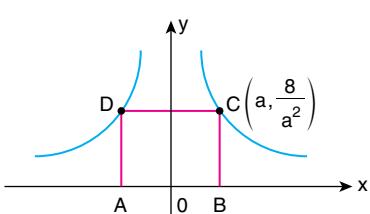
$$\Rightarrow 32r - 32r^3 = 0$$

$$\Rightarrow 32r(1 - r^2) = 0$$

$$\Rightarrow r = 1 \text{ alınır.}$$

CEVAP: D

9.



$$|AB| = 2a, |BC| = \frac{8}{a^2} \text{ dir.}$$

$$\mathcal{C}(ABCD) = 2\left(2a + \frac{8}{a^2}\right) = 4a + \frac{16}{a^2}$$

$$\mathcal{C}' = 0 \Rightarrow 4 - \frac{32}{a^3} = 0$$

$$\Rightarrow 4a^3 = 32 \Rightarrow a^3 = 8$$

$$\Rightarrow a = 2$$

$$\mathcal{C}(ABCD) = 4 \cdot 2 + \frac{16}{2^2} = 8 + 4 = 12 \text{ bulunur.}$$

CEVAP: C

$$10. T = x^2 + y^2 = x^2 + (2x + 4)^2$$

$$= x^2 + 4x^2 + 16x + 16$$

$$= 5x^2 + 16x + 16$$

$$T' = 0 \Rightarrow 10x + 16 = 0$$

$$\Rightarrow x = -\frac{8}{5}$$

$$T = 5 \cdot \frac{64}{25} + 16 \cdot \left(-\frac{8}{5}\right) + 16$$

$$= \frac{64}{5} - \frac{128}{5} + \frac{80}{5}$$

$$= \frac{16}{5} \text{ bulunur.}$$

CEVAP: D

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$$11. f(x) = x^3 - 6ax^2 + 48a$$

$$f'(x) = 3x^2 - 12ax = 3x(x - 4a)$$

x	0	4a
f'	+	-
f		

yerel minimum noktası

yerel minimum değer;

$$m = f(4a) = (4a)^3 - 6a \cdot (4a)^2 + 48a$$

$$= 64a^3 - 96a^3 + 48a$$

$$= -32a^3 + 48a$$

$$m' = -96a^2 + 48 = 48(1 - \sqrt{2}a)(1 + \sqrt{2}a)$$

a	-\$\frac{1}{\sqrt{2}}	\$\frac{1}{\sqrt{2}}
m'	-	+
m		

yerel minimum değer olan m, en büyük değerini

$$a = \frac{1}{\sqrt{2}} \text{ için alır.}$$

CEVAP: C

12. $f(x) = a(x + 3)x^2 = a(x^3 + 3x^2)$

$f'(x) = a.(3x^2 + 6x) = a.3x(x + 2)$

x	-2	0
f'	+	o
f	↗	↘

$f(x)$ in yerel maksimum noktasının apsisi -2 bulunur.

CEVAP: A

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1. $\int d(x^2 + 5x) = x^2 + 5x + c$

CEVAP: B

2. $\frac{d}{dx} \int (x^3 + 2) dx = x^3 + 2$

CEVAP: D

3. $\int (x^2 - 3x + 5) dx = \frac{x^3}{3} - \frac{3x^2}{2} + 5x + c$

CEVAP: C

4. $\int \frac{dx}{\sqrt[3]{x^2}} = \int x^{-\frac{2}{3}} dx = \frac{\frac{-2}{3}+1}{-\frac{2}{3}+1} + c$
 $= \frac{x^{\frac{1}{3}}}{\frac{1}{3}} + c = 3\sqrt[3]{x} + c$

CEVAP: A

5. $\int \frac{4\sqrt{x} \cdot 3\sqrt{x}}{x} dx = \int \frac{x^{\frac{1}{4}} \cdot x^{\frac{3}{2}}}{x} dx$
 $= \int x^{\frac{1}{4} + \frac{1}{3} - \frac{1}{1}} dx = \int x^{\frac{3+4-12}{12}} dx$
 $= \int x^{\frac{-5}{12}} dx = \frac{x^{\frac{-5}{12}+1}}{\frac{-5}{12}+1} + c = \frac{x^{\frac{7}{12}}}{\frac{7}{12}} + c$
 $= \frac{12}{7} \cdot \sqrt[12]{x^7} + c$

CEVAP: A

6. $(\int (x-2).f(x) dx)' = (x^3 - 12x)'$
 $(x-2).f(x) = 3x^2 - 12$
 $(x-2).f(x) = 3(x^2 - 4)$
 $(x-2).f(x) = 3(x-2)(x+2)$
 $f(x) = 3x + 6$

CEVAP: E

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7. $\int f'(x) dx = \int (4x^3 - 2x + 3) dx \quad f(0) = 2$
 $f(x) = \frac{4x^4}{4} - \frac{2x^2}{2} + 3x + c$
 $f(x) = x^4 - x^2 + 3x + c$
 $f(0) = 0 - 0 + 0 + c = 2 \quad c = 2$
 $f(x) = x^4 - x^2 + 3x + 2$
 $f(-2) = 16 - 4 - 6 + 2 = 8$

CEVAP: C

8. y ekseninin kestiği nokta x = 0 için f(0) = -2

$$\begin{aligned} \int f'(x) dx &= \int (3x^2 - 6x + 2) dx \\ f(x) &= \frac{3x^3}{3} - \frac{6x^2}{2} + 2x + c \\ f(0) &= 0 - 0 + 0 + c = -2 \\ f(x) &= x^3 - 3x^2 + 2x - 2 \\ f(-1) &= -1 - 3 - 2 - 2 = -8 \end{aligned}$$

CEVAP: E

Integral

9. $f(x)$ fonksiyonunun $(1, 2)$ noktasındaki teğeti x ekseni ile 135° açı yapıyor ise

$$f(1) = 2 \text{ ve } f'(1) = \tan 135^\circ = -1$$

$$\int f''(x)dx = \int (24x)dx \quad \int f'(x)dx = \int (12x^2 - 13)dx$$

$$f'(x) = \frac{24x^2}{2} + c$$

$$f'(1) = 12 + c = -1$$

$$c = -13$$

$$f(x) = \frac{12x^3}{3} - 13x + c$$

$$f(1) = 4 - 13 + c = 2$$

$$c = 11$$

$$f(x) = 4x^3 - 13x + 11$$

$$f(0) = 11$$

CEVAP: B

10. $\left(\int x^2 \cdot f(x)dx\right)' = (x^6 - 18x^5 - 4x^3 + 5)'$

$$\frac{x^2 \cdot f(x)}{x^2} = \frac{6x^5 - 90x^4 - 12x^2}{x^2}$$

$$f(x) = 6x^3 - 90x^2 - 12$$

dönüm noktası $f''(x) = 0$

$$f'(x) = 18x^2 - 180x$$

$$f''(x) = 36x - 180 \Rightarrow 36x - 180 = 0$$

$$36x = 180$$

$x = 5$ dönüm noktası

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CEVAP: C

11. $\int xda + \int xdx$

$$= x.a + \frac{x^2}{2} + c$$

CEVAP: E

12. $\int \frac{dx(x^5)}{5x^3} = \int \frac{5x^4}{5x^3}dx = \int xdx$

$$= \frac{x^2}{2} + c$$

CEVAP: A

$$13. \int \frac{dx}{\sqrt{3x-2}} = \int (3x-2)^{-\frac{1}{2}} dx$$

$$= \frac{1}{3} \cdot \frac{(3x-2)^{\frac{1}{2}}}{\frac{1}{2}} = \frac{2}{3}\sqrt{3x-2} + c$$

CEVAP: A

$$14. \int 3(x+2)^2 dx = \frac{3 \cdot (x+2)^3}{3} + c$$

$$= (x+2)^3 + c$$

CEVAP: E

$$15. \int \frac{f'(x)x - f(x)}{x^2} dx = \int \left(\frac{f(x)}{x}\right)' dx$$

$$= \frac{f(x)}{x} + c$$

CEVAP: D

$$16. \int (x^2 - 2x)^3 (2x-2) dx = \int u^3 du$$

$$x^2 - 2x = u$$

$$(2x-2)dx = du$$

$$= \frac{u^4}{4} + c = \frac{(x^2 - 2x)^4}{4} + c$$

CEVAP: A



1. $\int \left(\frac{x}{3} + \frac{x^2}{2} + \frac{5}{6} \right) dx = \frac{x^2}{6} + \frac{x^3}{6} + \frac{5x}{6} + c$

CEVAP: B

2. $f(x) = \int (2x - 4) dx = x^2 - 4x + c$
 $f(1) = 5 \Rightarrow -3 + c = 5$
 $\Rightarrow -3 + c = 5$
 $\Rightarrow c = 8$
 $f(x) = x^2 - 4x + 8$
 $f(0) = 8$ bulunur.

CEVAP: D

3. $\int (4\sqrt[3]{x} + 6\sqrt{x}) dx = \int \left(4x^{\frac{1}{3}} + 6x^{\frac{1}{2}} \right) dx$
 $= \frac{4x^{\frac{4}{3}}}{\frac{4}{3}} + \frac{6x^{\frac{3}{2}}}{\frac{3}{2}} + c$
 $= 3x^{\frac{4}{3}} + 4x^{\frac{3}{2}} + c$

CEVAP: C

4. $\int (4xy + 2y) dx = \frac{4x^2y}{2} + 2xy + c$
 $= 2x^2y + 2xy + c$

CEVAP: A

5. $\int (4xy + 2y) dy = \frac{4xy^2}{2} + y^2 + c$
 $= 2xy^2 + y^2 + c$

CEVAP: B

6. $\int \left(\frac{4}{x^2} + \frac{6}{3\sqrt[3]{x}} \right) dx = \int \left(4x^{-2} + 6x^{-\frac{1}{3}} \right) dx$
 $= \frac{4x^{-1}}{-1} + \frac{6x^{\frac{2}{3}}}{\frac{2}{3}} + c$
 $= -\frac{4}{x} + 9\sqrt[3]{x^2} + c$

CEVAP: E

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7. $f'(x) = 2x^3 - 6x^2 + 4$
 $f(x) = \int (2x^3 - 6x^2 + 4) dx$
 $= \frac{2x^4}{4} - \frac{6x^3}{3} + 4x + c$
 $= \frac{x^4}{2} - 2x^3 + 4x + c$

CEVAP: E

8. $\int \frac{x^2 - 2x - 24}{6-x} dx = \int \frac{(x-6)(x+4)}{6-x} dx$
 $= \int (-x-4) dx$
 $= -\frac{x^2}{2} - 4x + c$

CEVAP: C

9. $f(3) = \int 10x \left(x^3 + \frac{1}{5}\right) dx$
 $= \int (10x^4 + 2x) dx$
 $= \frac{10x^5}{5} + \frac{2x^2}{2} + c$
 $= 2x^5 + x^2 + c$

CEVAP: D

10. $\int (3x - 2)(x + 4) dx = \int (3x^2 + 10x - 8) dx$
 $= x^3 + 5x^2 - 8x + c$ bulunur.

CEVAP: C

11. $\int \left(\frac{x-1}{3} + \frac{x+1}{2}\right) dx = \int \frac{2x-2+3x+3}{6} dx$
 $= \int \frac{1}{6}(5x+1) dx$
 $= \frac{1}{6} \left(\frac{5x^2}{2} + x\right) + c$

CEVAP: A

12. $\int f(x) dx = x^3 - 5$
 $\frac{d}{dx} \left(\int f(x) dx \right) = \frac{d}{dx} (x^3 - 5)$
 $f(x) = 3x^2$

CEVAP: C

13. $\int (x+1)f(x) dx = 4x^2 - 6x + 1$
 $\frac{d}{dx} \left(\int (x+1).f(x) dx \right) = \frac{d}{dx} (4x^2 - 6x + 1)$
 $(x+1)f(x) = 8x - 6$
 $f(x) = \frac{8x - 6}{x+1}$
 $f(1) = \frac{8-6}{1+1} = \frac{2}{2} = 1$ bulunur.

CEVAP: C

14. $P(x) = ax + b$
 $\int P(x) dx + P(x) = 2x^2 - 5x + c$

Her iki tarafın türevi alınırsa

$$\begin{aligned} P(x) + P'(x) &= 4x - 5 \\ ax + b + a &= 4x - 5 \\ \Rightarrow a &= 4, b + a = -5 \\ b &= -9 \end{aligned}$$

$P(x) = 4x - 9$, katsayılar toplamı -5 bulunur.

CEVAP: A

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15. $\int (f(x) + f'(x)) dx = x^3 - 6x + c$

Her iki tarafın türevi alınırsa

$$\begin{aligned} f(x) + f'(x) &= 3x^2 - 6, f(x) = ax^2 + bx + c, f'(x) = 2ax + b \\ ax^2 + bx + c + 2ax + b &= 3x^2 - 6 \\ \Rightarrow a &= 3, b + 2a = 0, c + b = -6 \\ b &= -6 \quad c = 0 \end{aligned}$$

$f(x) = 3x^2 - 6x$ bulunur, sabit terimi sıfırdır.

CEVAP: B

16. $g(3x - 1) = \int f(2x) dx$ iki tarafın türevi alınır.
 $g'(3x - 1) \cdot 3 = f(2x)$
 $x = 2$ için $g'(5) \cdot 3 = f(4)$
 $\Rightarrow f(4) = -4 \cdot 3 = -12$ bulunur.

CEVAP: A



1. $\int 2dt + \int 3du = 2t + 3u + c$

CEVAP: D

2. $\int \frac{4x^3+2}{x^2} dx = \int (4x + 2x^{-2}) dx$
 $= 4\frac{x^2}{2} + \frac{2x^{-1}}{-1} + c$
 $= 2x^2 - \frac{2}{x} + c$

CEVAP: B

3. $\int \frac{5\sqrt[3]{x} \cdot \sqrt{x}}{4\sqrt[4]{x}} dx = \int \frac{5x^{\frac{1}{3}} \cdot x^{\frac{1}{2}}}{x^{\frac{1}{4}}} dx$
 $= \int 5x^{\frac{1}{3} + \frac{1}{6} - \frac{1}{4}} dx = \int 5x^{\frac{1}{4}} dx$
 $= 5\frac{x^{\frac{5}{4}}}{\frac{5}{4}} + c = 4x^{\frac{5}{4}} + c$

CEVAP: A

4. $\int \frac{3x - f(x)}{x} dx + \int \frac{2x + f(x)}{x} dx$
 $= \int \frac{3x - f(x) + 2x + f(x)}{x} dx$
 $= \int 5dx = 5x + c$ bulunur.

CEVAP: C

5. $\int (u^2 + 2v) dv - \int (2uv - v) du$
 $= u^2v + v^2 - u^2v + uv + c$
 $= v^2 + u \cdot v + c$ bulunur.

CEVAP: E

6. $F(x) = \int (1 + 2x + 3x^2) dx = x + x^2 + x^3 + c_1$
 $F(1) = 9 \Rightarrow 1 + 1 + 1 + c = 9$
 $\Rightarrow c_1 = 6$
 $F(x) = x^3 + x^2 + x + 6$
 $\int F(x) dx = \frac{x^4}{4} + \frac{x^3}{3} + \frac{x^2}{2} + 6x + c_2$ bulunur.

CEVAP: D

7. $\int \frac{f(x)}{x} dx = x^3 - 4x + 6$
 İki tarafın türevi alınırsa,
 $\frac{f(x)}{x} = 3x^2 - 4$
 $\Rightarrow f(x) = 3x^3 - 4x$
 $f'(x) = 9x^2 - 4$
 $f'(-2) = 36 - 4 = 32$ bulunur.

CEVAP: A

8. $f'(x) = 4x - 3$, iki tarafın integrali alınırsa,
 $f(x) = \int (4x - 3) dx = 2x^2 - 3x + c$
 $f(2) = 6 \Rightarrow 8 - 6 + c = 6$
 $\Rightarrow c = 4$
 $f(x) = 2x^2 - 3x + 4$
 $f(-1) = 2 + 3 + 4 = 9$ bulunur.

CEVAP: D

Integral

9. $f(2) = 1, f'(2) = -1$

$f''(x) = 6x$, iki tarafın integrali alınırsa,

$$f'(x) = 3x^2 + c_1$$

$$f'(2) = -1 \Rightarrow 12 + c_1 = -1, c_1 = -13$$

$f'(x) = 3x^2 - 13$, iki tarafın integrali alınırsa,

$$f(x) = x^3 - 13x + c_2$$

$$f(2) = 1 \Rightarrow 8 - 26 + c_2 = 1, c_2 = 19$$

$f(x) = x^3 - 13x + 19$, y eksenini kestiği noktanın ordinatı, $f(0) = 19$ bulunur.

CEVAP: E

10. $y = 3x^2 - 6$ fonksiyonunun diferansiyeli,

$dy = 6x \cdot dx$ dir.

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CEVAP: B

11. $u = 5t - 1$ ise $t = \frac{u+1}{5}$

$$dt = \frac{1}{5} \cdot du \text{ bulunur.}$$

CEVAP: C

12. $df(x) = (10x - 7)dx \Rightarrow \int df(x) = \int (10x - 7)dx$
 $\Rightarrow f(x) = 5x^2 - 7x + c$ bulunur.

CEVAP: A

13. $df(y) = (4u + 2y)dy \Rightarrow \int df(y) = \int (4u + 2y)dy$
 $\Rightarrow f(y) = 4uy + y^2 + c$ bulunur.

CEVAP: B

14. $\frac{d(x^2 + 7)}{d(2x - 6)} = \frac{2x \cdot dx}{2 \cdot dx} = x$ bulunur.

CEVAP: C

15. $\int d(f(2x) + x) = f(2x) + x + c$ bulunur.

CEVAP: E

16. $df(x) = (x^2 - 6x + 1) \cdot dx$

$$\Rightarrow \int df(x) = \int (x^2 - 6x + 1)dx$$

$$\Rightarrow f(x) = \frac{x^3}{3} - 3x^2 + x + c$$

$$f'(x) = x^2 - 6x + 1$$

Ekstremum noktalarının apsisleri toplamı:

$$x_1 + x_2 = -\frac{b}{a} = 6$$

CEVAP: E



1. $\int (x^2 + 4)^3 \cdot 2x \, dx, \quad u = x^2 + 4$
 $du = 2x \, dx$
 $= \int u^3 \, du$ bulunur.

CEVAP: B

2. $\int 4f'(2x+1)dx = \frac{4f(2x+1)}{2} + c$
 $= 2f(2x+1) + c$ bulunur.

CEVAP: D

3. $\int \left(\frac{x-1}{3}\right)^2 dx = \frac{\left(\frac{x-1}{3}\right)^3}{3 \cdot \frac{1}{3}} + c$
 $= \left(\frac{x-1}{3}\right)^3 + c$

CEVAP: D

4. $\int \sqrt[3]{(4x-7)} dx = \int (4x-7)^{\frac{1}{3}} dx$
 $= \frac{(4x-7)^{\frac{4}{3}}}{\frac{4}{3} \cdot 4} + c$
 $= \frac{3}{16} \cdot \sqrt[3]{(4x-7)^4} + c$ bulunur.

CEVAP: E

5. $\int \frac{2dx}{(6x-1)^3} = \int 2(6x-1)^{-3} dx$
 $= \frac{2(6x-1)^{-2}}{-2 \cdot 6} + c$
 $= -\frac{1}{6(6x-1)^2} + c$ bulunur.

CEVAP: A

6. $\int 8x \cdot (x^2 - 7)^3 dx, \quad u = x^2 - 7$
 $du = 2x \, dx$
 $= \int 4u^3 \, du = u^4 + c = (x^2 - 7)^4 + c$ bulunur.

CEVAP: C

7. $\int \frac{3x \, dx}{(x^2 - 6)^3}, \quad u = x^2 - 6$
 $du = 2x \, dx$
 $= \int \frac{3}{2} \cdot \frac{du}{u^3} = \int 3 \cdot \frac{u^{-3}}{2} du = \frac{3u^{-2}}{-2 \cdot 2} + c$
 $= -\frac{3}{4u^2} + c = -\frac{3}{4(x^2 - 6)^2} + c$

CEVAP: D

8. $g(1) = 2, g(2) = 6$

$f(2) = 8, f(6) = 4$

$$\begin{aligned} F(x) &= \int f'(g(x)) \cdot g'(x) \, dx \\ \Rightarrow F(x) &= (fog)(x) + c \end{aligned}$$

$F(1) = -3 \Rightarrow (fog)(1) + c = -3$

$f(2) + c = -3$

$8 + c = -3, c = -11$

$F(x) = (fog)(x) - 11$

$F(2) = (fog)(2) - 11$

$= f(6) - 11$

$= 4 - 11 = -7$ bulunur.

CEVAP: E

Integral

9. $\int (x^2 + 1) \cdot \sqrt[6]{(x^3 + 3x)} dx$, $u = x^3 + 3x$
 $du = (3x^2 + 3) dx$
 $\frac{du}{3} = (x^2 + 1) dx$

$$= \int \sqrt[6]{u} \cdot \frac{du}{3}$$

$$= \int \frac{1}{3} u^{1/6} du$$

$$= \frac{1}{3} \cdot \frac{u^{7/6}}{\frac{7}{6}} + c$$

$$= \frac{2}{7} \cdot \sqrt[6]{(x^3 + 3x)^7} + c \text{ bulunur.}$$

CEVAP: B

10. $\int x^2 \cdot f^2(x^3) \cdot f'(x^3) dx$, $u = f(x^3)$
 $du = f'(x^3) \cdot 3x^2 dx$
 $\frac{du}{3} = f'(x^3) \cdot x^2 dx$

$$\int u^2 \cdot \frac{du}{3}$$

$$= \frac{1}{3} \cdot \frac{u^3}{3} + c$$

$$= \frac{f^3(x^3)}{9} + c \text{ bulunur.}$$

CEVAP: D

11. $\int f(\sqrt{x}) dx$, $x = u^2$
 $dx = 2udu$

$$= \int f(u) \cdot 2udu$$

CEVAP: E

12. $\int x(x-1)^8 dx$, $u = x-1$
 $du = dx$

$$= \int (u+1) \cdot u^8 du$$

$$= \int (u^8 + u^9) du$$

$$= \frac{u^9}{9} + \frac{u^{10}}{10} + c$$

$$= \frac{(x-1)^9}{9} + \frac{(x-1)^{10}}{10} + c \text{ bulunur.}$$

CEVAP: D

13. $\int \frac{x dx}{(x+2)^5}$, $u = x+2$
 $du = dx$

$$= \int \frac{u-2}{u^5} du$$

$$= \int \left(\frac{1}{u^4} - \frac{2}{u^5} \right) du$$

$$= \int (u^{-4} - 2u^{-5}) du$$

$$= \frac{u^{-3}}{-3} - \frac{2u^{-4}}{-4} + c$$

$$= -\frac{1}{3(x+2)^3} + \frac{1}{2(x+2)^4} + c \text{ bulunur.}$$

CEVAP: A

14. $\int \frac{\sqrt[3]{2x-7} + 4}{\sqrt{2x-7}} dx$, $u^6 = 2x-7$

$$6u^5 du = 2dx$$

$$3u^5 du = dx$$

$$= \int \frac{\sqrt[3]{u^6} + 4}{\sqrt{u^6}} \cdot 3u^5 du$$

$$= \int \frac{(u^2 + 4) \cdot 3u^5}{u^3} du$$

$$= \int (3u^4 + 12u^2) du \text{ elde edilir.}$$

CEVAP: E



$$1. \int f'(x) \cdot f^2(x) dx = \int u^2 du = \frac{u^3}{3} + c$$

$$f(x) = u$$

$$f'(x) dx = du$$

$$= \frac{f^3(x)}{3} + c$$

CEVAP: A

$$4. \int 2xf(x) dx = g(x)$$

$$\int x^2 \cdot f'(x) dx = x^2 \cdot f(x) - \int 2xf(x) dx$$

$$= x^2 \cdot f(x) - g(x)$$

$$x^2 = u \quad \int f'(x) dx = \int du$$

$$2xdx = du \quad f(x) = \vartheta$$

CEVAP: B

$$2. \int \frac{dx}{x^2 - 10x + 25} = \int \frac{dx}{(x-5)^2} = \int (x-5)^{-2} dx$$

$$= \frac{(x-5)^{-1}}{-1} + c = \frac{-1}{x-5} + c$$

CEVAP: A

$$5. \int x \cdot \sqrt{x-1} dx = \int (u^2 + 1) \cdot u \cdot 2udu$$

$$\sqrt{x-1} = u \quad = \int 2u^3(u^2 + 1) du$$

$$x-1 = u^2$$

$$dx = 2udu$$

CEVAP: A

$$3. \int \frac{12dx}{\sqrt{4x+1}} = \int 12 \cdot (4x+1)^{-\frac{1}{2}} dx$$

$$= \frac{12 \cdot (4x+1)^{\frac{1}{2}}}{4 \cdot \frac{1}{2}} + c = 6\sqrt{4x+1} + c$$

CEVAP: C

$$6. \int \frac{3\sqrt{x+1} - 1}{\sqrt{x+1}} dx = \int \frac{3\sqrt{u^6} - 1}{\sqrt{u^6}} 6u^5 du$$

$$= \int \frac{u^2 - 1}{u^3} \cdot 6u^5 du$$

$$= 6 \int (u^2 - 1) \cdot u^2 du$$

$$\sqrt[6]{x+1} = u$$

$$x+1 = u^6$$

$$dx = 6u^5 du$$

CEVAP: C

Integral

7.
$$\int_{-2}^1 (2x+5)dx = \frac{2x^2}{2} + 5x \Big|_{-2}^1$$

$$= (1+5) - (4-10) = 6+6 = 12$$

CEVAP: C

8.
$$\int_{-1}^0 \frac{dx}{\sqrt{x+2}} = \int_{-1}^0 (x+2)^{-\frac{1}{2}} dx$$

$$= \frac{(x+2)^{\frac{1}{2}}}{\frac{1}{2}} \Big|_{-1}^0 = 2\sqrt{2} - 2$$

CEVAP: A

9.
$$\int_9^{16} \frac{\sqrt{x}}{x-2} dx = \int_3^4 \frac{u}{u^2-2} 2udu$$

$$= \int_3^4 \frac{2u^2}{u^2-2} du$$

$\sqrt{x} = u \quad x = 9 \Rightarrow u = \sqrt{9} = 3$
 $x = u^2 \quad x = 16 \Rightarrow u = \sqrt{16} = 4$
 $dx = 2udu$

CEVAP: C

10.
$$\int_0^2 f(x)dx = 5$$

$$\int_0^2 f'(x)dx = 3$$

$$\underline{+}$$

$$\int_0^2 (f(x) + xf'(x))dx = 8$$

$$x.f(x) \Big|_0^2 = 8$$

$$2.f(2) - 0.f(0) = 8$$

$$f(2) = 4$$

CEVAP: C

11. $f(x)$ fonksiyonu A (-1, 2) ve B (2, 3) noktalarından geçmektedir.

$$f(-1) = 2 \quad f(2) = 3$$

$$\int_{-1}^2 \frac{x.f'(x) - f(x)}{x^2} dx = \frac{f(x)}{x} \Big|_{-1}^2$$

$$= \frac{f(2)}{2} - \frac{f(-1)}{-1} = \frac{3}{2} + 2 = \frac{7}{2}$$

CEVAP: E

12.
$$\int_1^4 \frac{4x-4}{\sqrt{x+1}} dx = \int_1^4 \frac{4(x-1)}{\sqrt{x+1}} dx$$

$$= \int_1^4 \frac{4(\sqrt{x}-1)(\sqrt{x}+1)}{\sqrt{x+1}} dx = 4 \int_1^4 (\sqrt{x}-1) dx$$

$$= 4 \left(\frac{\frac{3}{2}}{2} - x \Big|_1^4 \right)$$

$$= 4 \left(\frac{2}{3} \cdot 4^{\frac{3}{2}} - 4 - \frac{2}{3} + 1 \right)$$

$$= 4 \left(\frac{16}{3} - 3 - \frac{2}{3} \right) = 4 \cdot \frac{5}{3} = \frac{20}{3}$$

CEVAP: A

13.
$$f(x) = \begin{cases} 4x-3 & 3 \leq x \leq 5 \\ 2 & 2 \leq x < 3 \\ x+1 & 0 \leq x < 2 \end{cases}$$

$$\int_0^5 f(x)dx = \int_0^2 (x+1)dx + \int_2^3 2dx + \int_3^5 (4x-3)dx$$

$$= \frac{x^2}{2} + x \Big|_0^2 + 2x \Big|_2^3 + 2x^2 - 3x \Big|_3^5$$

$$= 2 + 2 + 6 + 50 - 15 - 18 + 9 = 32$$

CEVAP: B



1. $F(x) = \int_{-2}^3 (x^5 + x^3 + 4x + f(x)) dx$

$F(x)$ sabit olduğundan $F'(x) = 0$ dir.

CEVAP: B

2. $\int_{-1}^2 d(x^3 + 2) = (x^3 + 2) \Big|_{-1}^2 = (8 + 2) - (-1 + 2)$
 $= 10 - 1 = 9$ bulunur.

CEVAP: D

3. $\int_0^6 x \cdot d(x^2 + 4) = \int_0^6 x \cdot 2x dx = \int_0^6 2x^2 dx$
 $= \frac{2x^3}{3} \Big|_0^6 = \frac{2 \cdot 6^3}{3} - 0 = 144$ bulunur.

CEVAP: A

4. $\int_{-1}^1 f'(x+1) dx = f(x+1) \Big|_{-1}^1$
 $= f(2) - f(0) = (-5) - 2 = -7$ dir.

CEVAP: E

5. $\int_1^2 (3x^2 - ax + 4) dx = 5$
 $\Rightarrow \left(x^3 - \frac{ax^2}{2} + 4x \right) \Big|_1^2 = 5$
 $\Rightarrow (8 - 2a + 8) - \left(1 - \frac{a}{2} + 4 \right) = 5$
 $\Rightarrow 11 - \frac{3a}{2} = 5$
 $\Rightarrow a = 4$ bulunur.

CEVAP: C

6. $f'(3) = 0, f'(1) = \tan 60^\circ = \sqrt{3}$
 $\int_{-1}^1 f''(x+2) dx = f'(x+2) \Big|_{-1}^1$
 $= f'(3) - f'(1)$
 $= 0 - \sqrt{3} = -\sqrt{3}$ bulunur.

CEVAP: A

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7. $\int_3^{10} \frac{x+3}{x^2+3} dx + \int_3^{10} \frac{x^2-x}{x^2+3} dx$
 $= \int_3^{10} \frac{x+3+x^2-x}{x^2+3} dx$
 $= \int_3^{10} dx = x \Big|_3^{10} = 10 - 3 = 7$ bulunur.

CEVAP: B

8. $\int_{-1}^1 (2x-1)^3 dx = \frac{(2x-1)^4}{4 \cdot 2} \Big|_{-1}^1$
 $= \frac{1}{8} - \frac{(-3)^4}{8} = -\frac{80}{8} = -10$ bulunur.

CEVAP: E

Integral

$$9. \int_0^1 \sqrt{x} \cdot \sqrt[3]{x^2} dx = \int_0^1 \sqrt{3\sqrt[3]{x^3 x^2}} dx \\ = \int_0^1 6\sqrt{x^5} dx = \int_0^1 x^{\frac{5}{2}} dx$$

$$= \frac{x^{\frac{11}{2}}}{\frac{11}{2}} \Big|_0^1 = \frac{6}{11} \text{ bulunur.}$$

CEVAP: B

$$10. \int_{-1}^1 (x^3 + x)^2 \cdot \left(x^2 + \frac{1}{3}\right) dx, \quad u = x^3 + x \\ du = (3x^2 + 1) dx \\ \frac{du}{3} = \left(x^2 + \frac{1}{3}\right) dx \\ = \int u^2 \cdot \frac{du}{3} = \frac{u^3}{9} \\ = \frac{(x^3 + x)^3}{9} \Big|_{-1}^1 = \frac{8}{9} - \left(-\frac{8}{9}\right) = \frac{16}{9} \text{ bulunur.}$$

CEVAP: A

$$11. \int_1^2 x \cdot f'(x^2 + 1) dx, \quad u = x^2 + 1 \\ du = 2x dx \\ \frac{du}{2} = x dx \\ = \int f'(u) \frac{du}{2} \\ = \frac{f(u)}{2} = \frac{f(x^2 + 1)}{2} \Big|_1^2 = \frac{f(5) - f(2)}{2} \\ = \frac{3 - 5}{2} = -1 \text{ bulunur.}$$

CEVAP: C

$$12. \int_a^b (4x + 3) dx = 27 \Rightarrow (2x^2 + 3x) \Big|_a^b = 27 \\ \Rightarrow 2b^2 + 3b - 2a^2 - 3a = 27 \\ \Rightarrow 2(\underbrace{b-a}_3)(b+a) + 3(\underbrace{b-a}_3) = 27 \\ \Rightarrow 6(b+a) = 18 \\ \Rightarrow b+a = 3, \quad b = 3, \quad a = 0 \\ \Rightarrow b \cdot a = 3 \cdot 0 = 0 \text{ bulunur.}$$

CEVAP: C

$$13. P(x) = \int_1^{x^2} 3dt = 3t \Big|_1^{x^2} = 3x^2 - 3 \\ P(-4) = 3 \cdot 16 - 3 = 45 \text{ bulunur.}$$

CEVAP: D

$$14. f(u) = \int_v^u (-2x + u - v) dt \\ = (-2x + u - v) \cdot t \Big|_v^u \\ = (-2x + u - v) \cdot (u - v) \\ u \text{ yerine } x \text{ yazılırsa,} \\ f(x) = (-2x + x - v) \cdot (x - v) \\ = (-x - v)(x - v) \\ = v^2 - x^2 \text{ bulunur.}$$

CEVAP: C

$$15. \int_m^3 \left(\frac{1}{x^2} - 2\right) dx = -\frac{1}{3} \\ \left(-\frac{1}{x} - 2x\right) \Big|_m^3 = -\frac{1}{3} \\ \left(-\frac{1}{3} - 6\right) - \left(-\frac{1}{m} - 2m\right) = -\frac{1}{3} \\ 2m + \frac{1}{m} = 6 \\ \left(2m + \frac{1}{m}\right)^2 = 36 \Rightarrow 4m^2 + 4 + \frac{1}{m^2} = 36 \\ \Rightarrow 4m^2 + \frac{1}{m^2} = 32 \text{ bulunur.}$$

CEVAP: B

$$16. \int_{-1}^3 f\left(\frac{x-1}{2}\right) dx = 16, \quad \frac{x-1}{2} = u, \quad \frac{dx}{2} = du \\ \int_{-1}^1 f(u) \cdot 2 du = 16 \\ \Rightarrow \int_{-1}^1 f(u) du = 8 \\ \Rightarrow \int_{-1}^1 f(x) dx = 8 \text{ bulunur.}$$

CEVAP: E



1. $f(x) = \frac{d}{dx} \int (x^3 - 3x^2 + 6x + 8) dx = x^3 - 3x^2 + 6x + 8$
 $\frac{df(x)}{dx} = 3x^2 - 6x + 6$ bulunur.

CEVAP: D

2. $g(x) = \int (4xf(x) + 2x^2 f'(x)) dx$
 $= 2x^2 f(x) + c$

$g(0) = -5 \Rightarrow c = -5$

$g(x) = 2x^2 f(x) - 5$

$g(1) = 2f(1) - 5 = 2.6 - 5 = 7$ bulunur.

CEVAP: A

3. $g(x) = \int (3x - f'(x)) dx$
 $= \frac{3x^2}{2} - f(x) + c$

$dg(x) = (3x - f'(x)) dx$ bulunur.

CEVAP: C

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4. $\int_1^2 f(x) dx + \int_{-3}^0 f(x) dx$
 $= \int_1^2 5 dx + \int_{-3}^0 (6x + 1) dx$
 $= 5x \Big|_1^2 + (3x^2 + x) \Big|_{-3}^0$
 $= 10 - 5 + 0 - (27 - 3)$
 $= 5 - 24 = -19$ bulunur.

CEVAP: B

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5. $\int_{\frac{1}{2}}^4 f(x) dx = \int_{\frac{1}{2}}^1 -\frac{1}{x^2} dx + \int_1^4 \frac{1}{2\sqrt{x}} dx$
 $= \frac{1}{x} \Big|_{\frac{1}{2}}^1 + \sqrt{x} \Big|_1^4$
 $= 1 - 2 + \sqrt{4} - 1$
 $= 0$ bulunur.

CEVAP: E

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6. $\int_{-3}^1 f(x) dx = 1$
 $\int_{-3}^{-1} (4ax - 3) dx + \int_{-1}^1 (3x^2 + a) dx = 1$
 $(2ax^2 - 3x) \Big|_{-3}^{-1} + (x^3 + ax) \Big|_{-1}^1 = 1$
 $(2a + 3) - (18a + 9) + (1 + a) - (-1 - a) = 1$
 $-14a - 4 = 1$
 $a = -\frac{5}{14}$

bulunur.

CEVAP: A

7. $\int_{-1}^3 f'(2-x) dx = -f(2-x) \Big|_{-1}^3$
 $= -f(-1) + f(3)$
 $= 0 + 27 + 1$
 $= 28$ bulunur.

CEVAP: D

8. $\int_0^4 |4x+1| dx = \int_0^4 (4x+1) dx$
 $= (2x^2 + x) \Big|_0^4 = 2.16 + 4 - 0$
 $= 36$ bulunur.

CEVAP: E

9. $\int_2^6 |3-x| dx = \int_2^3 (3-x) dx + \int_3^6 (x-3) dx$
 $= \left(3x - \frac{x^2}{2} \right) \Big|_2^3 + \left(\frac{x^2}{2} - 3x \right) \Big|_3^6$
 $= \left(9 - \frac{9}{2} \right) - (6 - 2) + (18 - 18) - \left(\frac{9}{2} - 9 \right)$
 $= \frac{9}{2} - 4 + 0 + \frac{9}{2}$
 $= 5$ bulunur.

CEVAP: C

Integral

10. $a < 2$ olsun.

$$\int_{-1}^a |2x - 4| dx = \int_{-1}^a (4 - 2x) dx = (4x - x^2) \Big|_{-1}^a$$

$$4a - a^2 + 4 + 1 = 10$$

$$a^2 - 4a + 5 = 0$$

$\Delta < 0$, a değeri bulunamaz.

$a > 2$ olsun.

$$\int_{-1}^a |2x - 4| dx = \int_{-1}^2 (4 - 2x) dx + \int_2^a (2x - 4) dx$$

$$= (4x - x^2) \Big|_{-1}^2 + (x^2 - 4x) \Big|_2^a$$

$$(8 - 4) - (-4 - 1) + (a^2 - 4a) - (4 - 8) = 10$$

$$4 + 5 + a^2 - 4a + 4 = 10$$

$$a^2 - 4a + 3 = 0$$

$$a = 1 \text{ ve } a = 3$$

$a > 2$ olduğundan $a = 3$ alınır.

CEVAP: B

11. Grafiğe göre

$x > 1$ iken $f'(x) > 0$

$x < 1$ iken $f'(x) < 0$ dır.

$$\begin{aligned} \int_0^2 |f'(x)| dx &= \int_0^1 -f'(x) dx + \int_1^2 f'(x) dx \\ &= -f(x) \Big|_0^1 + f(x) \Big|_1^2 \\ &= -f(1) + f(0) + f(2) - f(1) \\ &= 1 + 2 + 6 + 1 \\ &= 10 \text{ bulunur.} \end{aligned}$$

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CEVAP: D

$$\begin{aligned} 12. \int_{-2}^2 |2 - |x|| dx &= \int_{-2}^0 |2 + x| dx + \int_0^2 |2 - x| dx \\ &= \int_{-2}^0 (2 + x) dx + \int_0^2 (2 - x) dx \\ &= \left(2x + \frac{x^2}{2}\right) \Big|_{-2}^0 + \left(2x - \frac{x^2}{2}\right) \Big|_0^2 \\ &= 0 - (-4 + 2) + (4 - 2) - 0 \\ &= 2 + 2 = 4 \text{ bulunur.} \end{aligned}$$

CEVAP: C

13. Grafiğe göre, $x < 1$ iken $g(x) > f(x)$

$x > 1$ iken $f(x) > g(x)$

$$\int_0^2 |f(x) - g(x)| dx$$

$$= \int_0^1 (g(x) - f(x)) dx + \int_1^2 (f(x) - g(x)) dx$$

$$= 5 + 7 = 12 \text{ bulunur.}$$

CEVAP: D

$$\begin{aligned} 14. \int_{-1}^2 f(x) dx &= \int_{-1}^0 6x dx + \int_0^2 |2x - 2| dx \\ &= \int_{-1}^0 6x dx + \int_0^1 (2 - 2x) dx + \int_1^2 (2x - 2) dx \\ &= 3x^2 \Big|_{-1}^0 + (2x - x^2) \Big|_0^1 + (x^2 - 2x) \Big|_1^2 \\ &= 0 - 3 + (2 - 1) - 0 + (4 - 4) - (1 - 2) \\ &= -3 + 1 + 0 + 1 \\ &= -1 \text{ bulunur.} \end{aligned}$$

CEVAP: B

$$\begin{aligned} 15. \int_{-x}^{2x} |x - 2y| dy &= \int_{-x}^{\frac{x}{2}} (x - 2y) dy + \int_{\frac{x}{2}}^{2x} (2y - x) dy \\ &= (xy - y^2) \Big|_{-x}^{\frac{x}{2}} + (y^2 - xy) \Big|_{\frac{x}{2}}^{2x} \\ &= \left(\frac{x^2}{2} - \frac{x^2}{4}\right) - (-x^2 - x^2) + (4x^2 - 2x^2) - \left(\frac{x^2}{4} - \frac{x^2}{2}\right) \\ &= \frac{x^2}{4} + 2x^2 + 2x^2 + \frac{x^2}{4} \\ &= \frac{9x^2}{2} \text{ bulunur.} \end{aligned}$$

CEVAP: E



$$\begin{aligned}
 1. \quad & \int_0^3 (f(x) + 2) dx = \int_0^3 (g(x) - x) dx \\
 & \Rightarrow \int_0^3 f(x) dx + \int_0^3 2 dx = \int_0^3 g(x) dx - \int_0^3 x dx \\
 & \Rightarrow \int_0^3 (f(x) - g(x)) dx = \int_0^3 (-2 - x) dx \\
 & = \left(-2x - \frac{x^2}{2} \right) \Big|_0^3 \\
 & = \left(-6 - \frac{9}{2} \right) - (0) \\
 & = -\frac{21}{2} \text{ bulunur.}
 \end{aligned}$$

CEVAP: C

$$\begin{aligned}
 2. \quad & \int_{-2}^3 d(x^3 + x^2 + 6) = (x^3 + x^2 + 6) \Big|_{-2}^3 \\
 & = (27 + 9 + 6) - (-8 + 4 + 6) \\
 & = 42 - 2 = 40 \text{ bulunur.}
 \end{aligned}$$

CEVAP: B

$$\begin{aligned}
 3. \quad & \int_1^4 \frac{d}{dx}(x^3 + x^2 + 5) dx = (x^3 + x^2 + 5) \Big|_1^4 \\
 & = (64 + 16 + 5) - (1 + 1 + 5) \\
 & = 85 - 7 \\
 & = 78 \text{ bulunur.}
 \end{aligned}$$

CEVAP: D

$$\begin{aligned}
 4. \quad & \int_{-3}^{-2} [x \cdot f'(x) + f(x)] dx = (xf(x)) \Big|_{-3}^{-2} \\
 & = -2f(-2) + 3f(-3) \\
 & = -2 \cdot 3 + 3 \cdot 1 \\
 & = -3 \text{ bulunur.}
 \end{aligned}$$

CEVAP: C

$$\begin{aligned}
 5. \quad & f(2) = 1, f'(2) = -1 \\
 & f(1) = 5, f'(1) = 0 \\
 & \int_1^2 (f''(x) - 2f'(x)) dx = (f'(x) - 2f(x)) \Big|_1^2 \\
 & = (f'(2) - 2f(2)) - (f'(1) - 2f(1)) \\
 & = (-1 - 2 \cdot 1) - (0 - 2 \cdot 5) \\
 & = -3 + 10 = 7 \text{ bulunur.}
 \end{aligned}$$

CEVAP: D

$$\begin{aligned}
 6. \quad & \int_{-2}^4 f(x) dx = 20 \\
 & \Rightarrow \int_{-2}^1 (g'(x) - 4x) dx + \int_1^4 (g'(x) + 2) dx = 20 \\
 & \Rightarrow (g(x) - 2x^2) \Big|_{-2}^1 + (g(x) + 2x) \Big|_1^4 = 20 \\
 & \Rightarrow (g(1) - 2) - (g(-2) - 8) + (g(4) + 8) - (g(1) + 2) = 20 \\
 & \Rightarrow g(4) - g(-2) + 12 = 20 \\
 & \Rightarrow g(4) - g(-2) = 8 \text{ bulunur.}
 \end{aligned}$$

CEVAP: A

$$\begin{aligned}
 7. \quad & \int_{-2}^1 f(x^2 + 4x) \cdot (x+2) dx, \quad u = x^2 + 4x \\
 & du = (2x+4) dx \\
 & = \int_{-4}^5 f(u) \cdot \frac{du}{2} \text{ bulunur.} \quad \frac{du}{2} = (x+2) dx \\
 & x = 1 \text{ için } u = 5 \\
 & x = -2 \text{ için } u = -4
 \end{aligned}$$

CEVAP: E

$$\begin{aligned}
 8. \quad & \int_2^4 (x-3) \cdot d(x^2+1) = \int_2^4 (x-3) \cdot 2x dx \\
 & = \int_2^4 (2x^2 - 6x) dx = \left(\frac{2x^3}{3} - 3x^2 \right) \Big|_2^4 \\
 & = \left(\frac{128}{3} - 48 \right) - \left(\frac{16}{3} - 12 \right) \\
 & = \frac{112}{3} - 36 = \frac{4}{3} \text{ bulunur.}
 \end{aligned}$$

CEVAP: B

$$\begin{aligned}
 9. \quad & \int_0^1 \frac{x^3}{x-1} dx + \int_1^0 \frac{1}{x-1} dx \\
 & = \int_0^1 \frac{x^3}{x-1} dx - \int_0^1 \frac{1}{x-1} dx \\
 & = \int_0^1 \frac{x^3-1}{x-1} dx = \int_0^1 (x^2 + x + 1) dx \\
 & = \left(\frac{x^3}{3} + \frac{x^2}{2} + x \right) \Big|_0^1 = \frac{1}{3} + \frac{1}{2} + 1 = \frac{11}{6} \text{ bulunur.}
 \end{aligned}$$

CEVAP: C

Integral

10. $\int_0^1 (4x^3 - 2P'(x))dx = 15$

$$\Rightarrow (x^4 - 2P(x)) \Big|_0^1 = 15$$

$$\Rightarrow (1 - 2P(1)) - (0 - 2P(0)) = 15$$

$$\Rightarrow 1 - 14 + 2P(0) = 15$$

$$\Rightarrow 2P(0) = 28$$

$$\Rightarrow P(0) = 14 \text{ bulunur.}$$

CEVAP: A

11. $f'(a) = \frac{a}{2} - 5$, iki tarafın integrali alınırsa,

$$\int f'(a)da = \int \left(\frac{a}{2} - 5\right)da$$

$$f(a) = \frac{a^2}{4} - 5a + c$$

$$\Rightarrow f(x) = \frac{x^2}{4} - 5x + c$$

$$f(x) = 0 \text{ denklemi için } x_1 + x_2 = -\frac{5}{\frac{1}{4}} = 20 \text{ bulunur.}$$

CEVAP: E

12. $\int_0^1 n \cdot x^{n+1} dx = \frac{1}{2}$

$$\Rightarrow n \cdot \frac{x^{n+2}}{n+2} \Big|_0^1 = \frac{1}{2}$$

$$\Rightarrow \frac{n}{n+2} = \frac{1}{2}$$

$$\Rightarrow 2n = n+2$$

$$\Rightarrow n = 2 \text{ bulunur.}$$

14. $x \in (0,2)$ için $f(x)$ azalandır. $f'(x) < 0$

$$\int_0^2 |f'(x)| dx = \int_0^2 -f'(x) dx$$

$$= -f(x) \Big|_0^2 = -f(2) + f(0)$$

$$= 0 + 4 = 4 \text{ bulunur.}$$

CEVAP: E

15. $\int_{-1}^1 xf(x)dx = \int_{-1}^0 4xdx + \int_0^1 x(-2x+4)dx$

$$= 2x^2 \Big|_{-1}^0 + \left(-\frac{2x^3}{3} + 2x^2 \right) \Big|_0^1$$

$$= 0 - 2 + \left(-\frac{2}{3} + 2 \right) - 0$$

$$= -2 + \frac{4}{3} = -\frac{2}{3} \text{ bulunur.}$$

CEVAP: B

13. $\int_1^2 f(3x-1)dx = A$,

$$\int_2^5 f(u) \cdot \frac{du}{3} = A$$

$$\int_2^5 f(u)du = 3A$$

$$\int_3^9 f\left(\frac{x+1}{2}\right)dx = A$$

$$= \int_2^5 2f(t)dt$$

$$= 2 \int_2^5 f(t)dt = 2 \cdot 3A$$

$$= 6A \text{ bulunur.}$$

$$\begin{cases} 3x-1 = u \\ 3dx = du \\ dx = \frac{du}{3} \\ x = 1 \Rightarrow u = 2 \\ x = 2 \Rightarrow u = 5 \end{cases}$$

$$\begin{cases} \frac{x+1}{2} = t \\ dx = 2dt \\ x = 3 \Rightarrow t = 2 \\ x = 9 \Rightarrow t = 5 \text{ olur.} \end{cases}$$

CEVAP: E

16. $x \in [-1,0)$ için $f(x) = -1$

$x \in [0,1)$ için $f(x) = 0$

$x \in [1,2)$ için $f(x) = 1$

$$\int_{-1}^2 xf(x)dx = \int_{-1}^0 -xdx + \int_0^1 xdx$$

$$= -\frac{x^2}{2} \Big|_{-1}^0 + \frac{x^2}{2} \Big|_0^1$$

$$= 0 + \frac{1}{2} + \frac{4}{2} - \frac{1}{2} = 2 \text{ bulunur.}$$

CEVAP: A

CEVAP: E



1. $\int_1^5 f(x)dx = 4 \int_1^3 (3 + f(2x - 1))dx$

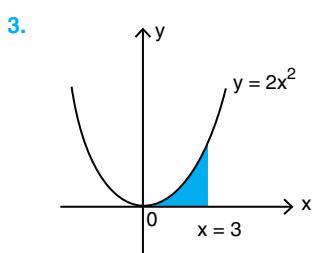
$$\begin{aligned} &\Downarrow && \Downarrow \\ F(x)\Big|_1^5 &= 4 & F(2x - 1)\Big|_1^3 &= 3x + \frac{F(2x - 1)}{2}\Big|_1^3 \\ &\Downarrow && \Downarrow \\ F(5) - F(1) &= 4 & = 9 + \frac{F(5)}{2} - 3 - \frac{F(1)}{2} &= 6 + \frac{4}{2} = 8 \end{aligned}$$

CEVAP: D

2. $f(x) = \int_{3x}^{x^2} (t^2 - t)dt$
 $x=1$ noktasındaki teğetinin eğimi $= f'(1)$

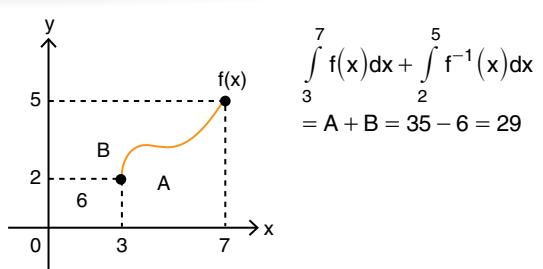
$$\begin{aligned} f'(x) &= 2x(x^4 - x^2) - 3(9x^2 - 3x) \\ f'(1) &= 2(1 - 1) - 3(9 - 3) = -18 \end{aligned}$$

CEVAP: C



$$\begin{aligned} A &= \int_0^3 (2x^2)dx \\ &= \frac{2x^3}{3}\Big|_0^3 \\ &= 2 \cdot \frac{27}{3} = 18 \end{aligned}$$

CEVAP: D



CEVAP: E

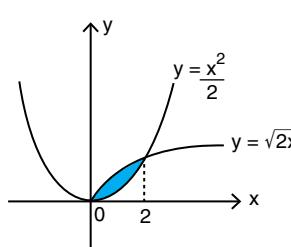
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5. $\int_0^6 (6x - x^2)dx = 3x^2 - \frac{x^3}{3}\Big|_0^6$
 $= 108 - 72 - 0 = 36$

CEVAP: D

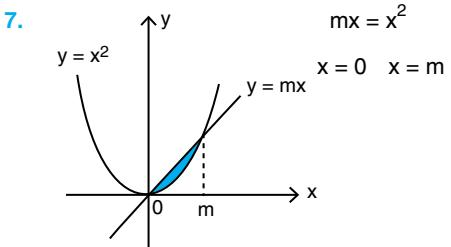


$$\begin{aligned} \frac{x^2}{2} &= \sqrt{2x} \\ \frac{x^4}{4} &= 2x \\ x = 0 & \quad x^3 = 8 \\ & \quad x = 2 \end{aligned}$$

$$\begin{aligned} &\int_0^2 \left(\sqrt{2x} - \frac{x^2}{2}\right)dx = \frac{\sqrt{2} \cdot x^{\frac{3}{2}}}{\frac{3}{2}} - \frac{x^3}{6}\Big|_0^2 \\ &= \frac{2}{3} \cdot \sqrt{2} \cdot \sqrt{8} - \frac{8}{6} = \frac{8}{3} - \frac{4}{3} = \frac{4}{3} \end{aligned}$$

CEVAP: C

Integral



$$\int_0^m (mx - x^2) dx = \frac{9}{250}$$

$$\left. \frac{mx^2}{2} - \frac{x^3}{3} \right|_0^m = \frac{9}{250}$$

$$\left. \frac{m^3}{2} - \frac{m^3}{3} - 0 \right|_0^m = \frac{9}{250}$$

$$\frac{m^3}{6} = \frac{9}{250} \Rightarrow m^3 = \frac{27}{125} \Rightarrow m = \frac{3}{5}$$

8.

$$\int_0^2 f(x) dx = a$$

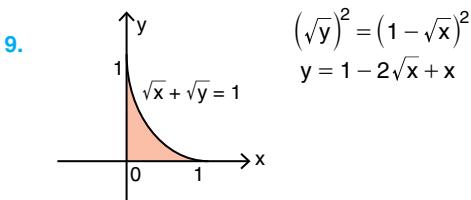
$$\int_2^5 f(x) dx = -b \quad \int_5^8 f(x) dx = c$$

$$\int_0^8 |f(x)| dx = \int_0^5 f(x) dx + \int_5^8 |f(x)| dx$$

$$= \int_0^2 |f(x)| dx + \int_2^5 |f(x)| dx + \int_5^8 |f(x)| dx$$

$$- \int_0^2 f(x) dx - \int_2^5 f(x) dx$$

$$= a + b + c - a + b = 2b + c$$



$$\int_0^1 (1 - 2\sqrt{x} + x) dx = x - 2 \cdot \frac{x^{3/2}}{3} + \frac{x^2}{2} \Big|_0^1$$

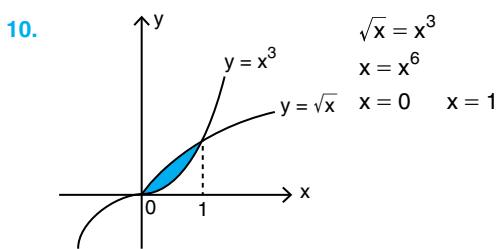
$$= 1 - 2 \cdot \frac{2}{3} + \frac{1}{2} = \frac{6 - 8 + 3}{6} = \frac{1}{6}$$

CEVAP: A

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CEVAP: D



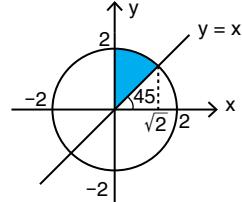
$$\int_0^1 (\sqrt{x} - x^3) dx = \left. \frac{x^{3/2}}{\frac{3}{2}} - \frac{x^4}{4} \right|_0^1$$

$$= \frac{2}{3} - \frac{1}{4} - 0 = \frac{5}{12}$$

CEVAP: B

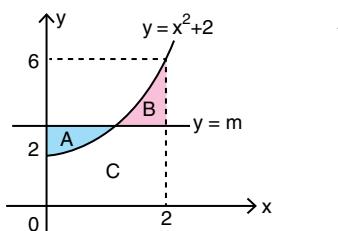
11. $\int_0^{\sqrt{2}} (\sqrt{4 - x^2} - x) dx = \text{Taralı alan}$

$$\begin{aligned} \sqrt{4 - x^2} &= y & y &= x \\ 4 - x^2 &= y^2 & & \\ x^2 + y^2 &= 4 & & \end{aligned}$$



$$\begin{aligned} \text{Taralı alan} &= \frac{\pi r^2}{360^\circ} \cdot \alpha \\ &= \frac{\pi \cdot 2^2 \cdot 45^\circ}{360^\circ} = \frac{\pi}{2} \end{aligned}$$

CEVAP: A



$$B + C = \int_0^2 (x^2 + 2) dx$$

$$A + C = 2m$$

$$2m = \int_0^2 (x^2 + 2) dx$$

$$2m = \left. \frac{x^3}{3} + 2x \right|_0^2$$

$$2m = \frac{8}{3} + 4 \Rightarrow 2m = \frac{20}{3} \Rightarrow m = \frac{10}{3}$$

CEVAP: B

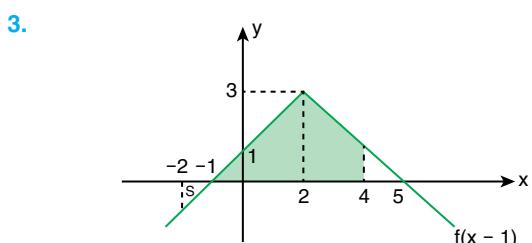


$$\begin{aligned} 1. \quad \int_{-3}^2 \left(f(x) + |f(x)| \right) dx &= \int_{-3}^2 f(x) dx + \int_{-3}^2 |f(x)| dx \\ &= S_2 - S_1 + S_1 + S_2 \\ &= 2S_2 = 2 \cdot 7 = 14 \text{ bulunur.} \end{aligned}$$

CEVAP: C

$$\begin{aligned} 2. \quad -3x^2 + 6 = 0 \Rightarrow x = \sqrt{2}, x = -\sqrt{2} \\ \int_0^{\sqrt{2}} (-3x^2 + 6) dx + \int_{-\sqrt{2}}^2 (3x^2 - 6) dx \\ = (-x^3 + 6x) \Big|_0^{\sqrt{2}} + (x^3 - 6x) \Big|_{-\sqrt{2}}^2 \\ = (-2\sqrt{2} + 6\sqrt{2}) - 0 + (8 - 12) - (2\sqrt{2} - 6\sqrt{2}) \\ = 4\sqrt{2} - 4 + 4\sqrt{2} = 8\sqrt{2} - 4 \text{ bulunur.} \end{aligned}$$

CEVAP: B



$$\begin{aligned} \int_{-2}^4 f(x-1) dx &= -S + \text{Taralı Bölgenin Alanı} \\ &= -\frac{1}{2} + \left(\frac{6 \cdot 3}{2} - \frac{1}{2} \right) \\ &= -\frac{1}{2} + 9 - \frac{1}{2} = 8 \text{ bulunur.} \end{aligned}$$

CEVAP: B

$$\begin{aligned} 4. \quad y = 0 \text{ için } 4x^3 - 4 = 0 \Rightarrow x = 1 \\ \int_0^1 (-4x^3 + 4) dx = (-x^4 + 4x) \Big|_0^1 \\ = (-1 + 4) - 0 = 3 \text{ bulunur.} \end{aligned}$$

CEVAP: E

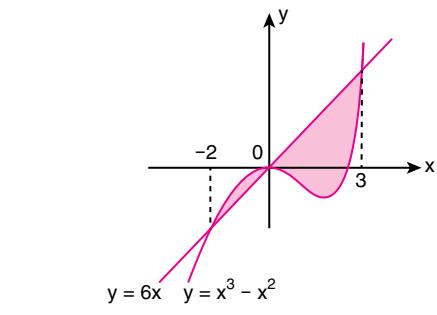
$$\begin{aligned} 5. \quad \int_{-2}^0 \frac{-x}{\sqrt{1+x^2}} dx + \int_0^1 \frac{x}{\sqrt{1+x^2}} dx \\ \frac{1+x^2}{1+x^2} = u \quad \frac{1+x^2}{1+x^2} = t \\ 2xdx = du \quad 2xdx = dt \\ x=0 \text{ için } u=1 \quad x=1 \text{ için } t=2 \\ x=-2 \text{ için } u=5 \quad x=0 \text{ için } t=1 \\ = \int_5^1 \frac{-du}{2\sqrt{u}} + \int_1^2 \frac{dt}{2\sqrt{t}} = -\sqrt{u} \Big|_5^1 + \sqrt{t} \Big|_1^2 \\ = -\sqrt{5} + \sqrt{5} + \sqrt{2} - \sqrt{1} = \sqrt{5} + \sqrt{2} - 2 \text{ bulunur.} \end{aligned}$$

CEVAP: A

$$\begin{aligned} 6. \quad \int_0^4 (f(x) - 2) dx &= \int_0^2 (f(x) - 2) dx + \int_2^4 (f(x) - 2) dx \\ &= -S_1 + S_2 = -6 + 4 = -2 \text{ bulunur.} \end{aligned}$$

CEVAP: C

7.



$$x^3 - x^2 = 6x$$

$$x^3 - x^2 - 6x = 0$$

$$x(x - 3)(x + 2) = 0$$

$$x = 0, x = 3, x = -2$$

$$\begin{aligned} \text{Taralı alan} &= \int_{-2}^0 (x^3 - x^2 - 6x) dx + \int_0^3 (6x - x^3 + x^2) dx \\ &= \left(\frac{x^4}{4} - \frac{x^3}{3} - 3x^2 \right) \Big|_{-2}^0 + \left(3x^2 - \frac{x^4}{4} + \frac{x^3}{3} \right) \Big|_0^3 \\ &= 0 - \left(4 + \frac{8}{3} - 12 \right) + \left(27 - \frac{81}{4} + 9 \right) - 0 \\ &= \frac{16}{3} + \frac{63}{4} = \frac{64 + 189}{12} = \frac{253}{12} \text{ bulunur.} \end{aligned}$$

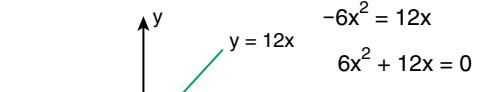
CEVAP: B

8.

$$\begin{aligned} \int_0^3 (f(x) - 6x) dx &= \int_0^3 f(x) dx - \int_0^3 6x dx \\ &= 10 - (3x^2) \Big|_0^3 \\ &= 10 - 27 + 0 \\ &= -17 \text{ bulunur.} \end{aligned}$$

CEVAP: E

9.



$$\begin{aligned} -6x^2 &= 12x \\ 6x^2 + 12x &= 0 \\ 6x(x + 2) &= 0 \\ x = 0, x = -2 & \end{aligned}$$

$$\begin{aligned} \int_{-2}^0 (-6x^2 - 12x) dx &= (-2x^3 - 6x^2) \Big|_{-2}^0 \\ &= 0 - (16 - 24) \\ &= 8 \text{ bulunur.} \end{aligned}$$

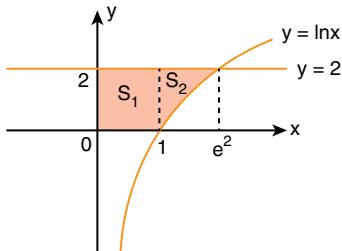
CEVAP: C

10.

$$\begin{aligned} \int_{-1}^2 (f(x) - ax^2) dx &= 7 \\ \Rightarrow \int_{-1}^2 f(x) dx - \int_{-1}^2 ax^2 dx &= 7 \\ \Rightarrow \frac{37}{4} - \frac{ax^3}{3} \Big|_{-1}^2 &= 7 \\ \Rightarrow \frac{37}{4} - \left(\frac{8a}{3} + \frac{a}{3} \right) &= 7 \\ \Rightarrow \frac{37}{4} - 7 &= 3a \\ \Rightarrow a = \frac{3}{4} & \text{ bulunur.} \end{aligned}$$

CEVAP: E

11.



$$\ln x = 2$$

$$x = e^2$$

$$S_1 = 2 \cdot 1 = 2 \text{ birim kare}$$

$$\begin{aligned} S_2 &= \int_1^{e^2} (2 - \ln x) dx = (2x + x - x \ln x) \Big|_1^{e^2} \\ &= (3x - x \ln x) \Big|_1^{e^2} \\ &= (3e^2 - e^2 \ln e^2) - (3 - \ln 1) \\ &= 3e^2 - e^2 \end{aligned}$$

$$= e^2 - 3 \text{ birim kare}$$

$$\text{Taralı alan} = S_1 + S_2 = 2 + e^2 - 3 = e^2 - 1 \text{ birimkare}$$

CEVAP: B

12. $f(0) = 6$

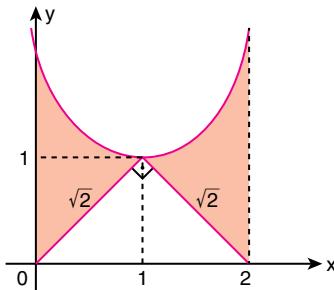
$$\begin{aligned} \int_0^2 -f'(x) dx &= 20 \\ \Rightarrow -f(x) \Big|_0^2 &= 20 \\ \Rightarrow -f(2) + f(0) &= 20 \\ \Rightarrow f(2) &= f(0) - 20 = 6 - 20 = -14 \text{ bulunur.} \end{aligned}$$

CEVAP: D



1. $y = x^2 - 2x + 2$ parabolünün tepe noktası

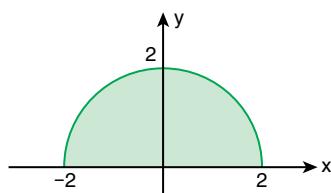
$$T\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right) = T(1, 1)$$



Taralı bölgenin alanı

$$\begin{aligned} & \int_0^2 (x^2 - 2x + 2) dx - \frac{\sqrt{2} \cdot \sqrt{2}}{2} \\ &= \left(\frac{x^3}{3} - x^2 + 2x \right) \Big|_0^2 - 1 \\ &= \frac{8}{3} - 4 + 4 - 0 - 1 \\ &= \frac{5}{3} \text{ bulunur.} \end{aligned}$$

2.

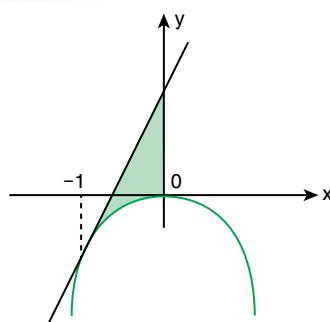


$\int_{-2}^2 \sqrt{4 - x^2} dx$ integrali yukarıdaki yarı dairenin alanına eşittir.

$$\int_{-2}^2 \sqrt{4 - x^2} dx = \frac{\pi \cdot 2^2}{2} = 2\pi \text{ bulunur.}$$

CEVAP: E

3.



$$\begin{aligned} f(x) &= -3x^2, f'(x) = -6x \\ f(-1) &= -3, f'(-1) = 6 \end{aligned}$$

Teğetenin denklemi:

$$\begin{aligned} y + 3 &= 6(x + 1) \\ y &= 6x + 3 \end{aligned}$$

Taralı bölgenin alanı:

$$\begin{aligned} & \int_{-1}^0 (6x + 3 + 3x^2) dx = \left(3x^2 + 3x + x^3 \right) \Big|_{-1}^0 \\ &= 0 - (3 - 3 - 1) = 1 \text{ bulunur.} \end{aligned}$$

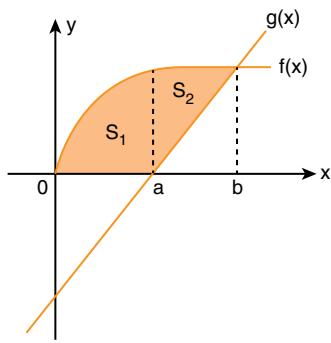
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CEVAP: A

4.



$$S_1 = \int_0^a f(x) dx$$

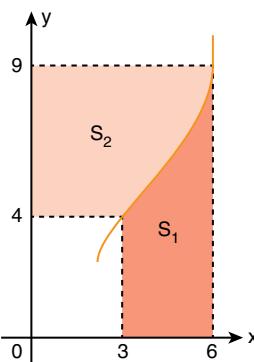
$$S_2 = \int_a^b (f(x) - g(x)) dx$$

Taralı bölgenin alanı:

$$S_1 + S_2 = \int_0^a f(x) dx + \int_a^b (f(x) - g(x)) dx$$

ile ifade edilir.

6.



$$\begin{aligned} \int_0^6 g(x) dx &= S_1 = 20 \\ \int_4^9 g^{-1}(x) dx &= S_2 \\ S_1 + S_2 + 4.3 &= 6.9 \\ S_2 &= 54 - 12 - S_1 \\ S_2 &= 42 - 20 = 22 \end{aligned}$$

bulunur.

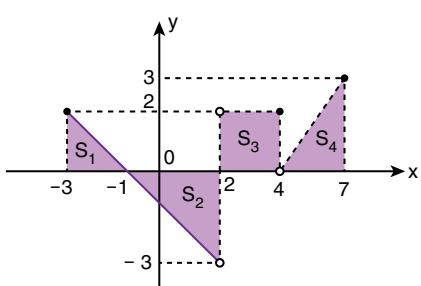
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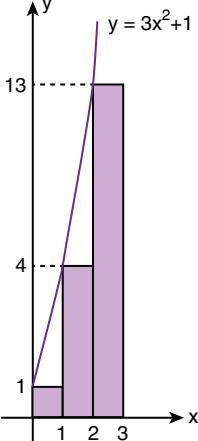
5.



$$\begin{aligned} \int_{-3}^7 f(x) dx &= S_1 - S_2 + S_3 + S_4 \\ &= \frac{2.2}{2} - \frac{3.3}{2} + 2.2 + \frac{3.3}{2} \\ &= 2 + 4 = 6 \text{ bulunur.} \end{aligned}$$

CEVAP: A

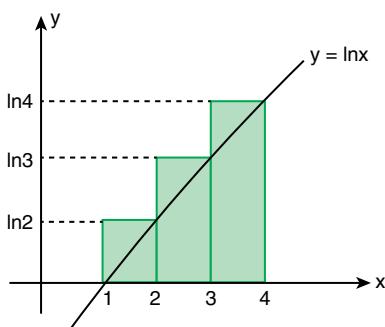
7.



$$1 + 1.4 + 1.13 = 18 \text{ bulunur.}$$

CEVAP: D

8.

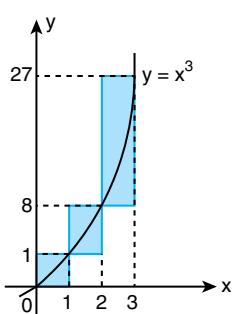


$$1 \cdot \ln 2 + 1 \cdot \ln 3 + 1 \cdot \ln 4 = \ln(2 \cdot 3 \cdot 4)$$

= $\ln 24$ bulunur.

CEVAP: C

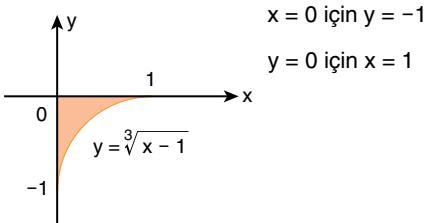
9.



$$1 \cdot 1 + 1 \cdot 7 + 1 \cdot 19 = 27 \text{ bulunur.}$$

CEVAP: A

10.



Taralı bölgenin alanı:

$$\int_0^1 -\sqrt[3]{x-1} dx = \int_0^1 -(x-1)^{\frac{1}{3}} dx$$

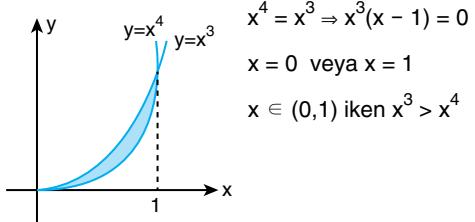
$$= -\frac{(x-1)^{\frac{4}{3}}}{\frac{4}{3}} \Big|_0^1 = 0 + \frac{3}{4}$$

$$= \frac{3}{4} \text{ bulunur.}$$

CEVAP: E

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11.



$$x^4 = x^3 \Rightarrow x^3(x-1) = 0$$

$$x = 0 \text{ veya } x = 1$$

$$x \in (0, 1) \text{ iken } x^3 > x^4$$

Taralı bölgenin alanı:

$$\int_0^1 (x^3 - x^4) dx = \left(\frac{x^4}{4} - \frac{x^5}{5} \right) \Big|_0^1$$

$$= \frac{1}{4} - \frac{1}{5} = \frac{1}{20} \text{ bulunur.}$$

CEVAP: C

Integral

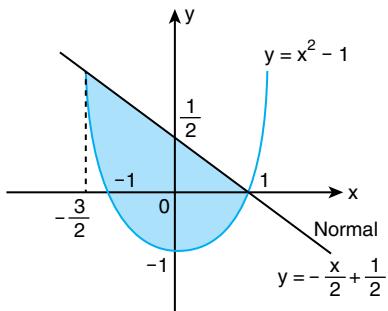
12. $f(x) = x^2 - 1$, $f'(x) = 2x$

$$f(1) = 0$$

$x = 1$ deki teğet eğimi: $f'(1) = 2$

$x = 1$ deki normal eğimi: $-\frac{1}{2}$ dir.

$$\text{Normalin denklemi: } y = -\frac{1}{2}(x - 1) = -\frac{x}{2} + \frac{1}{2}$$



Kesişim Noktaları:

$$x^2 - 1 = -\frac{x}{2} + \frac{1}{2}$$

$$2x^2 - 2 = -x + 1$$

$$2x^2 + x - 3 = 0$$

$$(2x+3)(x-1) = 0$$

$$x = -\frac{3}{2}, x = 1$$

Taralı bölgenin alanı:

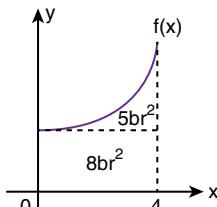
$$\int_{-\frac{3}{2}}^1 \left(-\frac{x}{2} + \frac{1}{2} - x^2 + 1 \right) dx$$

$$= \left(-\frac{x^2}{4} + \frac{3x}{2} - \frac{x^3}{3} \right) \Big|_{-\frac{3}{2}}^1$$

$$= \left(-\frac{1}{4} + \frac{3}{2} - \frac{1}{3} \right) - \left(-\frac{9}{16} - \frac{9}{4} + \frac{9}{8} \right) = \frac{11}{12} + \frac{27}{16}$$

$$= \frac{44 + 81}{48} = \frac{125}{48} \text{ bulunur.}$$

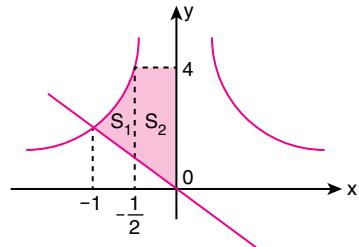
13.



$$\begin{aligned} & \int_0^4 (f(x) - 2x) dx \\ &= \int_0^4 f(x) dx - \int_0^4 2x dx \\ &= 5 + 8 - x^2 \Big|_0^4 \\ &= 13 - 16 + 0 \\ &= -3 \text{ bulunur.} \end{aligned}$$

CEVAP: A

14.



$$\frac{1}{x^2} = 4 \Rightarrow x = \frac{1}{2}, x = -\frac{1}{2}$$

$$\frac{1}{x^2} = -x \Rightarrow x^3 = -1$$

$$\Rightarrow x = -1$$

$$S_1 = \int_{-1}^{-\frac{1}{2}} \left(\frac{1}{x^2} + x \right) dx$$

$$= \left(-\frac{1}{x} + \frac{x^2}{2} \right) \Big|_{-1}^{-\frac{1}{2}} = \left(2 + \frac{1}{8} \right) - \left(1 + \frac{1}{2} \right)$$

$$= 1 - \frac{3}{8} = \frac{5}{8}$$

$$S_2 = \int_{-\frac{1}{2}}^0 (4 + x) dx = \left(4x + \frac{x^2}{2} \right) \Big|_{-\frac{1}{2}}^0$$

$$= 0 - \left(-2 + \frac{1}{8} \right) = \frac{15}{8}$$

$$\text{Taralı Alan} = S_1 + S_2 = \frac{5}{8} + \frac{15}{8} = \frac{20}{8} = \frac{5}{2} \text{ bulunur.}$$

CEVAP: C

CEVAP: B