

16

1. $\frac{12^3 + 12^3 + 12^3}{6^4 + 6^4 + 6^4 + 6^4} = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

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2. $x = 2$ ve $y = -2 \Rightarrow x - y^{x-y} = ?$

- E) 32 A) 64 B) 16 C) 14 D) -14 E) -16

3. $\frac{(-a^5) \cdot (-a)^3 + 2 \cdot (-a)^5 \cdot (-a^3) \cdot (-a^0)}{(-a^3)^2} = ?$

- A) $-a^3$ B) $-a^2$ C) $-a$ D) a^2 E) a^3

5

4. $\frac{2^4 \cdot 10^3}{6 + 3 \cdot 2^{-4} + 5 \cdot 2^{-4} + 3 \cdot 2^{-1}} = ?$

- A) $2 \cdot 10^{-3}$ B) $3 \cdot 10^3$ C) $2 \cdot 10^3$ D) $4 \cdot 10^{-2}$ E) 10^3

5. $5^x + 5^{-x} = a,$

$5^x - 5^{-x} = b$

$\Rightarrow a^2 - b^2 = ?$

- A) 1 B) 2 C) 3 D) 4 E) 8

6. $5^a \cdot 3^b = 125,$

$3^a \cdot 5^b = 27$

$\Rightarrow a + b = ?$

- A) 7 B) 5 C) 4 D) 3 E) 2

7. $a^{2x} + b^{2x} = 169$ ve (and) $a^x - b^x = 5 \Rightarrow a^x \cdot b^x = ?$

- A) 36 B) 68 C) 72 D) 108 E) 144

8. $3^x = 32, 9^y = 4 \Rightarrow \frac{x+2y}{x-y} = ?$

- A) $\frac{4}{7}$ B) $\frac{3}{5}$ C) $\frac{5}{3}$ D) $\frac{6}{5}$ E) $\frac{7}{4}$

9. $12^x = 9, 3^y = 2 \Rightarrow y = ?$

- A) $\frac{2x}{x+1}$ B) $\frac{2-x}{2x}$ C) $\frac{x-1}{x+1}$ D) $\frac{x+1}{2}$ E) $\frac{x-1}{3}$

10. $x^{3a+b} = 80,$

$x^b - a = 5$

$\Rightarrow x^a = ?$

- A) 4 B) 3 C) 2 D) 1 E) 0

11. $a^4 = 2$ ve $a^x \cdot a^y = 32 \Rightarrow x + y = ?$

- A) 4 B) 16 C) 20 D) 24 E) 36

12. $4^x = 5 \Rightarrow 16^{x-1} = ?$

- A) -2 B) $-\frac{1}{8}$ C) $\frac{1}{5}$ D) $\frac{25}{16}$ E) 4

13. $9^{2x-1} = 81$ ve (and) $\frac{2x}{4y-x} = 1 \Rightarrow \frac{x}{y} = ?$

- A) 1 B) $\frac{4}{3}$ C) $\frac{5}{3}$ D) 2 E) $\frac{7}{3}$

14. $10^{x+1} = 2^{x+2} \Rightarrow 5^{-2x} = ?$

- A) $\frac{5}{4}$ B) $\frac{25}{4}$ C) $\frac{125}{4}$ D) $\frac{625}{4}$ E) 1

15. $2^x = \frac{1}{y} \Rightarrow 16^{\frac{1-x}{4}} = ?$

- A) $\frac{16}{y}$ B) $16y$ C) $4y$ D) $\frac{4}{y}$ E) $8y$

16. $3^{\frac{1}{a}} = 5 \Rightarrow 125^a - 25^a + 1 = ?$

- A) 9 B) 15 C) 19 D) 24 E) 30

17. $(0,5)^{2x} = 3 \Rightarrow (0,25)^{2x} = ?$

- A) 27 B) 9 C) 3 D) 3^{-1} E

18. $4^{2x-3} = 16^x \cdot A \Rightarrow A = ?$

- A) $\frac{1}{64}$ B) $\frac{1}{8}$ C) $\frac{1}{2}$ D) 2

19. $4^{12} = x^x \Rightarrow x = ?$

- A) 2 B) 3 C) 4 D) 8 E

20. $\frac{a^{x+y+3} - a^{x+3}}{a^{x+y} - a^x} = ?$

- A) a B) a^2 C) a^3 D) a^x E

21. $3^{x-1} = m \Rightarrow 3^{x+3} - 3^{x+2} - 3^{x+1} = ?$

- A) 7m B) 15m C) 34m D) 45m E

Yanıtlar / Answers

1. A	2. D	3. B	4. C	5. D
7. C	8. E	9. B	10. C	11. C
13. B	14. B	15. B	16. C	17. B
19. D	20. C	21. D		

$$1. \frac{2}{1+3^{-a}} + \frac{2}{1+3^a} + 1 = ?$$

- A) 2 B) 3 C) 4 D) 5 E) 6

$$2. \frac{(x^2)^{-1} \cdot (x^6)^{-3}}{(x)^{-3} \cdot (x^{-4})^2 \cdot (x^2)^{-4}} = ?$$

- A) 1 B) x^{-1} C) x^{-2}
D) x^{-3} E) x^{-4}

$$3. \left(\frac{0,2}{0,004} + \frac{0,3}{0,006} \right)^{-\frac{1}{2}} = ?$$

- A) 0,1 B) 0,2 C) 0,3 D) 0,4 E) 0,5

$$4. \frac{a^{n+1} + a}{a^n} - \frac{1}{a^{n-1}} = ?$$

- A) 2 B) a^3 C) a^2 D) a E) $\frac{1}{a}$

$$5. \frac{3^{x+1} + 3^{x-1}}{3^x - 3^{x+2}} = ?$$

- A) $-\frac{7}{5}$ B) $-\frac{6}{7}$ C) $-\frac{7}{12}$
D) $-\frac{5}{12}$ E) $-\frac{8}{9}$

$$6. (-2)^2 \cdot (-2)^3 \cdot (-2^{-1}) \cdot (-2)^{-3} = ?$$

- A) -2 B) 2^{-5} C) 2^{-6} D) 2^{-2} E) 2^{-3}

$$7. \frac{4^2 + \left(\frac{1}{4}\right)^{-3}}{4 + \left(\frac{1}{4}\right)^{-2}} = ?$$

- A) 2 B) 4 C) 8 D) 16 E) 32

$$8. \frac{(0,6)^2}{0,03} : \frac{(0,3)^4}{(0,1)^2} = ?$$

- A) $\frac{400}{37}$ B) $\frac{250}{17}$ C) $\frac{400}{27}$
D) $\frac{340}{27}$ E) $\frac{300}{13}$

$$9. \frac{2 \cdot 5^{22} - 9 \cdot 5^{21}}{25^{10}} = ?$$

- A) 5^{-1} B) 1 C) 5 D) 5^2 E) 5^3

$$10. \frac{4 \cdot 9^{n-1} - 2 \cdot 3^{n-2}}{2 \cdot 3^{2n} - 3^n} = ?$$

- A) $\frac{2}{3}$ B) $\frac{3}{4}$ C) $\frac{2}{7}$ D) $\frac{5}{7}$ E) $\frac{2}{9}$

$$11. \frac{\left(-\frac{1}{3}\right)^2 \cdot (-3^4)}{(-3^{-3}) \cdot \left(-\frac{1}{3}\right)^{-4}} = ?$$

- A) $\frac{1}{3}$ B) $\frac{1}{9}$ C) 1 D) 3 E) 9

$$12. \left[\frac{a^{-1} - b^{-1}}{a^{-1} b^{-1}} \right] = ?$$

- A) a B) b C) a - b D) b - a E) ab

$$13. \left(\frac{1 - \frac{1}{4}}{1 + \frac{1}{4}} \right)^{-1} : \frac{1 + \frac{1}{3}}{1 - \frac{1}{3}} = ?$$

- A) $-\frac{3}{8}$ B) $-\frac{5}{8}$ C) 0 D) $\frac{3}{8}$ E) $\frac{5}{8}$

$$14. 2 - [3^{-1} - (2^{-1} - 3^{-1}) - (-2)^{-1}]^{-1} = ?$$

- A) $\frac{1}{5}$ B) $\frac{1}{2}$ C) $\frac{2}{3}$ D) $\frac{4}{5}$ E) 2

$$15. \frac{3}{2 + 2^{-1}} \cdot (0,16)^{-\frac{1}{2}} = ?$$

- A) 3 B) 2 C) $\frac{2}{3}$ D) $\frac{1}{2}$ E) $\frac{1}{3}$

$$16. \frac{\left(\frac{1}{2}\right)^{-2} - 5(-2)^{-2} + 6^{-1}}{1 + 2^{-2}} = ?$$

- A) $\frac{11}{5}$ B) $\frac{7}{3}$ C) 3 D) 5 E) 7

$$17. \frac{4^{2n+2} \cdot 3^{2n-1}}{6^{n-1} \cdot 2^{3n+1}} : 3^n = ?$$

- A) 16 B) 12 C) 8 D) 5 E) :

$$18. 27^{0,17} \cdot 4^{0,46} \cdot 3^{0,99} \cdot 2^{0,58} - 2^{\frac{3}{2}} \cdot 3^{\frac{3}{2}} = ?$$

- A) -6 B) $-3^{\frac{1}{2}}$ C) 0 D) 3 E) 6

$$19. 20^2 \cdot 40^4 \cdot 80^5 = ?$$

- A) $2^{11} \cdot 5^{11}$ B) $2^{36} \cdot 5^{11}$ C) $2^{15} \cdot 5^{11}$
D) $4^8 \cdot 5^8$ E) $2^{18} \cdot 5^{10}$

$$20. \frac{\frac{3 \cdot 2^{-4}}{5^4} + 4 \cdot 10^{-5}}{10^{-5}} = ?$$

- A) 0,3 B) 0,7 C) 7 D) 15 E) 34

Yanıtlar / Answers					
1. B	2. B	3. A	4. D	5. D	6. A
7. B	8. C	9. C	10. E	11. D	12. D
13. B	14. B	15. A	16. B	17. A	18. C
19. B	20. E				

1. $\frac{(4,01)^2 - (3,99)^2}{(0,5)^2 - (0,3)^2} = ?$

- A) 2 B) 1,2 C) 1 D) 0,1 E) 1,3

2. $\left. \begin{array}{l} 3^{2x} - 3^{2a} = 16 \\ 3^x + 3^a = 8 \end{array} \right\} \Rightarrow a = ?$

- A) -1 B) 0 C) 1 D) 2 E) $\frac{1}{2}$

3. $\left. \begin{array}{l} 4^{x+2y} = 8 \\ 8^{x+y} = 16 \end{array} \right\} \Rightarrow y = ?$

- A) $\frac{1}{3}$ B) $\frac{1}{4}$ C) $\frac{1}{5}$ D) $\frac{1}{6}$ E) $\frac{1}{7}$

4. $\left. \begin{array}{l} 2^x = 9 \\ 2^{2y} = 27 \end{array} \right\} \Rightarrow \frac{x+2y}{2y-4x} = ?$

- A) -1 B) 0 C) 1 D) 2 E) 3

5. $\left. \begin{array}{l} 3^x + 2^{y+1} = 91 \\ 4 \cdot 3^x - 2 \cdot 2^y = 44 \end{array} \right\} \Rightarrow x \cdot y = ?$

- A) 8 B) 10 C) 12 D) 15 E) 20

6. $\frac{6^{x+2}}{4^{1-x}} = \frac{24^x}{3^{2x-1}} \Rightarrow x = ?$

- A) $-\frac{1}{2}$ B) -1 C) 0 D) $\frac{1}{2}$ E) $\frac{2}{3}$

7. $2^x = 3 \Rightarrow 2^{2x+1} = ?$

- A) 9 B) 14 C) 16 D) 18 E) 20

8. $8^x = 27 \Rightarrow 2^{x+1} = ?$

- A) 2 B) 4 C) 6 D) 8 E) 12

9. $\left(\frac{1}{4}\right)^{2x-1} \cdot 2^x = 8^{x-2} \Rightarrow x = ?$

- A) $-\frac{3}{4}$ B) $-\frac{2}{3}$ C) $\frac{1}{2}$ D) $\frac{2}{3}$ E) $\frac{4}{3}$

10. $4^{a+3} \cdot 16^{a+1} \cdot 32^{1-a} = 1 \Rightarrow a = ?$

- A) -20 B) -15 C) -2 D) 15 E) 20

$$11. 4^{a+3} - 4^{a+2} + 4^{a+1} - 2 \cdot 4^a = 10^2 \Rightarrow a = ?$$

- A) $\frac{1}{2}$ B) 1 C) $\frac{3}{2}$ D) 2 E) $\frac{5}{2}$

$$12. 9^x = a \Rightarrow 3^{2x+1} = ?$$

- A) a B) 2a C) 3a D) 6a E) 9a

$$13. \begin{cases} a^{x+y} = 27 \\ a^{3y-x} = 3 \end{cases} \Rightarrow a^x = ?$$

- A) 3 B) 6 C) 9 D) 18 E) 21

$$14. \begin{cases} 2^x = a \\ 3^x = b \end{cases} \Rightarrow \frac{9^{x+2}}{6^{x+1}} = ?$$

- A) $\frac{18b}{2a}$ B) $\frac{b^2}{2a}$ C) $\frac{27b}{2a}$
D) $\frac{3b}{2a}$ E) $\frac{9b^2}{2a}$

$$15. \begin{cases} 4^{a-1} = 2 \\ 2^{2b} = 4 \end{cases} \Rightarrow a^{-b} = ?$$

- A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{3}{4}$
D) $\frac{4}{5}$ E) $\frac{5}{6}$

$$16. 2^{a-4} + 2^{a-3} = 3 \cdot 4^{a-3} \Rightarrow a = ?$$

- A) 2 B) 3 C) 4 D) 5 E) 6

$$17. \begin{cases} a = 3^{2b} \\ b = 3^{2a} \\ a + b = 3 \end{cases} \Rightarrow a \cdot b = ?$$

- A) 3^2 B) 3^4 C) 3^5 D) 3^6 E) 3^7

$$18. 2^x = m \Rightarrow 8^{x+3} = ?$$

- A) $(8m)^3$ B) $2m^2$ C) $4m^3$
D) $(5m)^3$ E) $(4m)^3$

$$19. x \neq 1, y \neq 1$$

$$\begin{cases} x^{x-y} = y^3 \\ y^{x-y} = \frac{x^2}{y} \end{cases} \Rightarrow x-y = ?$$

- A) 0 B) 1 C) 2 D) 3 E) 4

$$20. \begin{cases} 3^x \cdot 2^y = 81 \\ 2^y \cdot 9^x = 27 \end{cases} \Rightarrow x = ?$$

- A) -2 B) -1 C) 1 D) 2 E) 3

Yanıtlar / Answers

1. C	2. C	3. D	4. A	5. D	6. A
7. D	8. C	9. E	10. B	11. A	12. C
13. C	14. C	15. B	16. A	17. D	18. A
19. C	20. B				

1. $\left(\frac{0,00048}{0,00012}\right)^{x-2} = \left(\frac{0,06}{0,03}\right)^{x+1} \Rightarrow x = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

2. $3^x = 2 \Rightarrow 9^x + 4^{\frac{1}{x}} = ?$

- A) 7 B) 9 C) 10 D) 13 E) 25

3. $16^x = a \Rightarrow \frac{256^x - 16^x}{1 - 16^x} = ?$

- A) $1-a$ B) a C) a^2
D) $-a$ E) a^2-5

4. $9^y = a,$

$(0,3)^{-4y} \cdot (0,5)^{4y} = 16 \cdot a^2 \Rightarrow y = ?$

- A) -2 B) -1 C) 1 D) 2 E) 3

5. $\left. \begin{array}{l} x = 2^n - 3 \\ y = 2^n + 3 \\ xy = 8 \end{array} \right\} \Rightarrow x^2 + y^2 = ?$

- A) 32 B) 44 C) 50 D) 52 E) 64

6. $\left. \begin{array}{l} 5^a = 25^{b-1} \\ 4^{a-3} = 8^b \end{array} \right\} \Rightarrow a \cdot b = ?$

- A) 180 B) 160 C) 150 D) 140 E) 120

7. $\left. \begin{array}{l} 3^{x+1} = y \\ y^{x-1} = 27 \end{array} \right\} \Rightarrow x \cdot y = ?$

- A) $\frac{2}{3}$ B) 18 C) 27 D) 36 E) 54

8. $\frac{5^{x+2} - 125}{5^{2x} - 25} = \frac{5}{6} \Rightarrow x = ?$

- A) 5 B) 4 C) 3 D) 2 E) 0

9. $(0,6)^{2x-1} = \left(\frac{5}{3}\right)^{x-8} \Rightarrow x = ?$

- A) 5 B) 4 C) 3 D) 2 E) 0

10. $\frac{3 \cdot 2^{x-1} - 3 \cdot 2^x + 2^{x+1}}{2^x} = 2^{x-1} \Rightarrow x = ?$

- A) -1 B) 0 C) 1 D) 2 E) 3

11. $x, y \in \mathbb{Z}$

$$\left. \begin{array}{l} 3^x = a \\ 8^y = b \\ 24^{xy} = a^4 b^7 \end{array} \right\} \Rightarrow x + y = ?$$

- A) 13 B) 11 C) 10 D) 9 E) 5

12. $\frac{4^a - 9}{3 - 2^a} + 7 = 0 \Rightarrow a = ?$

- A) 5 B) 4 C) 3 D) 2 E) 1

13. $b > 0$

$$\left. \begin{array}{l} 3^{x+1} = a \\ 75^x = 4 \cdot \frac{ab^2}{3} \end{array} \right\} \Rightarrow 5^{x+1} = ?$$

- A) b B) 2b C) 5b
D) 10b E) 90b²

14. $\left. \begin{array}{l} 36^x = 8 \\ 4^y = 3 \end{array} \right\} \Rightarrow y = ?$

- A) $\frac{2-x}{2x}$ B) $\frac{3-2x}{5x}$ C) $\frac{3-2x}{4x}$
D) $\frac{x-2}{5x}$ E) $\frac{3-x}{2x}$

15. $3^{x+1} + 3^{x+2} = 36 \cdot 3^y \Rightarrow x = ?$

- A) $y+1$ B) y C) $y-1$
D) $2y$ E) $\frac{y+1}{3}$

16. $\frac{2^{x+1} + 6}{4^x - 9} = \frac{2}{5} \Rightarrow x = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

17. $x \in \mathbb{Z}$

$$\frac{3^{x^2+2}}{27^x} = 1 \Rightarrow \sum x = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

18. $3^{x+1} - 3^{x-2} + 3^x = 105 \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

19. $\frac{(0,000125 \cdot 10^{47}) - (0,61 \cdot 10^{43})}{(1,5 \cdot 10^{42}) - (0,7 \cdot 10^{42})} = ?$

- A) 8 B) 16 C) 32
D) $8 \cdot 10^{42}$ E) 2^{10}

20. $\left[\left(\frac{1}{4} - \frac{1}{3} - \frac{1 - \frac{2}{3}}{1 + \frac{1}{3}} \right)^{-4} \right]^2 = ?$

- A) $-\frac{1}{243}$ B) $-\frac{1}{81}$ C) $\frac{1}{128}$ D) 3^8 E) 2^{10}

Yanıtlar / Answers

1. D	2. D	3. D	4. B	5. D	6. A
7. E	8. D	9. C	10. B	11. B	12. D
13. D	14. C	15. A	16. B	17. C	18. C
19. A	20. D				

Tanım / Definition :

$a \in R, n \in Z^+$ olmak üzere, / *Provided that $a \in R, n \in Z^+$,*

$$\sqrt[n]{a} = x \Rightarrow x^n = a$$

$$\sqrt[n]{a^n} = a, n \text{ tek sayı} / n \text{ is an odd number}$$

$$\sqrt[n]{a^n} = |a| n \text{ çift sayı} / n \text{ is an even number}$$

$$a < 0 \Rightarrow \sqrt[n]{a^n} \in R n \text{ çift sayı} / n \text{ is an even number}$$

Örnek / Example:

$$\sqrt{0,25} + \sqrt{1,21} + \sqrt{1,44} = ?$$

Çözüm / Solution:

$$\begin{aligned} & \sqrt{0,25} + \sqrt{1,21} + \sqrt{1,44} \\ &= \sqrt{(0,5)^2} + \sqrt{(1,1)^2} + \sqrt{(1,2)^2} \\ &= 0,5 + 1,1 + 1,2 = 2,8 \end{aligned}$$

Örnek / Example:

$$\frac{\sqrt[3]{(-3)^3} - \sqrt[6]{(-3)^6}}{-\sqrt[4]{(-2)^2} - \sqrt[5]{(-3)^5}} = ?$$

Çözüm / Solution:

$$\begin{aligned} & \frac{\sqrt[3]{(-3)^3} - \sqrt[6]{(-3)^6}}{-\sqrt[4]{(-2)^2} - \sqrt[5]{(-3)^5}} \\ &= \frac{-3 - 3}{-2 - 3} = \frac{-6}{-5} = \frac{6}{5} \end{aligned}$$

Örnek / Example:

$$\frac{\sqrt{2,7} + \sqrt{5,4}}{\sqrt{0,1} + \sqrt{0,4}} = ?$$

Çözüm / Solution:

$$\begin{aligned} & \frac{\sqrt{2+\frac{7}{9}} + \sqrt{5+\frac{4}{9}}}{\sqrt{\frac{1}{9}} + \sqrt{\frac{4}{9}}} \\ &= \frac{\sqrt{\frac{25}{9}} + \sqrt{\frac{49}{9}}}{\frac{1}{3} + \frac{2}{3}} = \frac{\frac{5}{3} + \frac{7}{3}}{\frac{3}{3}} = \frac{12}{3} = 4 \end{aligned}$$



KÖKLÜ SAYILARIN ÖZELLİKLERİ
PROPERTIES of ROOTS

$$1. \sqrt[n]{a^n} = a^{\frac{n}{n}} = a$$

$$2. \sqrt[n]{\sqrt[m]{a}} = \sqrt[n \cdot m]{a}$$

$$3. \sqrt{a \pm \sqrt{b}} = \sqrt{\frac{a + \sqrt{a^2 - b}}{2}} \pm \sqrt{\frac{a - \sqrt{a^2 - b}}{2}}$$

$$4. \sqrt{a - \sqrt{b}} = \sqrt{\frac{a + \sqrt{a^2 - b}}{2}} - \sqrt{\frac{a - \sqrt{a^2 - b}}{2}}$$

$$5. x = \sqrt[n]{a \cdot \sqrt[n]{a \cdot \sqrt[n]{a \dots}}} = \sqrt[n]{a}$$

$$6. x = \sqrt[n]{a : \sqrt[n]{a : \sqrt[n]{a \dots}}} = \sqrt[n]{a}$$

$$7. a \cdot \sqrt[n]{x} + b \cdot \sqrt[n]{x} - c \cdot \sqrt[n]{x} = (a+b-c) \cdot \sqrt[n]{x}$$

$$8. \sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{a \cdot b}$$

$$\sqrt[n]{a} : \sqrt[n]{b} = \sqrt[n]{a:b}$$

$$9. \frac{a}{\sqrt{b}} = \frac{a \cdot \sqrt{b}}{\sqrt{b} \cdot \sqrt{b}} = \frac{a\sqrt{b}}{b}$$

$$10. \frac{a}{\sqrt{b}+\sqrt{c}} = \frac{a \cdot (\sqrt{b}-\sqrt{c})}{b-c}$$

$$11. \frac{a}{b-\sqrt{c}} = \frac{a \cdot (\sqrt{b}+\sqrt{c})}{b^2-c}$$

$$12. \sqrt{a+\sqrt{a+\sqrt{a+\dots}}} = \frac{1+\sqrt{1+4a}}{2} \quad (a>0)$$

$$13. \sqrt{a-\sqrt{a-\sqrt{a-\dots}}} = \frac{-1+\sqrt{1+4a}}{2} \quad (a \geq 0)$$

$$14. \frac{a}{b} \cdot \sqrt[n]{c} = \sqrt[n]{\frac{a^n \cdot c}{b^n}}$$

$$15. \sqrt[n]{a^m} = \sqrt[nr]{a^{mr}} = \sqrt[n]{a^{\frac{m}{r}}}$$

$$16. \begin{aligned} \sqrt{a(a+1)+\sqrt{a(a+1)+\sqrt{a(a+1)+\dots}}} &= a+1 \\ \sqrt{a(a+1)-\sqrt{a(a+1)-\sqrt{a(a+1)-\dots}}} &= a \end{aligned}$$

$$17. \begin{aligned} \left. \begin{array}{l} m+n=a \\ m \cdot n=b \end{array} \right\} &\Rightarrow \sqrt{a+2\sqrt{b}} = \sqrt{m} + \sqrt{n} \\ \left. \begin{array}{l} m+n=a \\ m \cdot n=b \\ m>n \end{array} \right\} &\Rightarrow \sqrt{a-2\sqrt{b}} = \sqrt{m} - \sqrt{n} \end{aligned}$$

Örnek / Example:

$$\sqrt[3]{3^{x+6}} + 9 \cdot \sqrt[3]{8 \cdot 3^x} = 9 \Rightarrow x = ?$$

A) -3 B) -1 C) 1 D) 3 E)

Çözüm / Solution:

$$\sqrt[3]{3^x \cdot 3^6} + 9 \cdot \sqrt[3]{8 \cdot 3^x} = 9$$

$$3^2 \sqrt[3]{3^x} + 2 \cdot 9 \sqrt[3]{3^x} = 9$$

$$27 \sqrt[3]{3^x} = 9$$

$$\frac{x}{3} = 3^{-1}$$

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

Yanıt / A)

Örnek / Example:

$$x+3 \sqrt{x-3 \sqrt{81}} = \sqrt[4]{3} \Rightarrow x = ?$$

A) 1 B) 3 C) 5 D) 7 E)

Çözüm / Solution:

$$x^2-9 \sqrt{81} = \sqrt[4]{3}$$

$$3^{\frac{4}{x^2-9}} = 3^{\frac{1}{4}}$$

$$\frac{4}{x^2-9} = \frac{1}{4}$$

$$x^2-9=16 \Rightarrow x^2=25$$

$$x=5$$

Yanıt / A)

Örnek / Example:

$$\sqrt{3-2\sqrt{2}} = ?$$

Çözüm / Solution:

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

$$= \sqrt{2}-1$$

Örnek / Example:

$$(2-\sqrt{3}) \cdot \sqrt{7+4\sqrt{3}} = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

Çözüm / Solution:

$$\begin{aligned} (2-\sqrt{3}) \sqrt{7+2 \cdot 2\sqrt{3}} \\ &= (2-\sqrt{3}) \cdot \sqrt{7+2\sqrt{12}} \\ &= (2-\sqrt{3}) \cdot (\sqrt{4} + \sqrt{3}) \\ &= (2)^2 - (\sqrt{3})^2 \\ &= 4 - 3 = 1 \end{aligned}$$

Yanıt / Answer A

Örnek / Example:

$$\sqrt{14+8\sqrt{3}} = 2\sqrt{2} + b \Rightarrow 2\sqrt{3} \cdot b = ?$$

- A) $\sqrt{2}$ B) $2\sqrt{2}$ C) $3\sqrt{2}$ D) $4\sqrt{2}$ E) $6\sqrt{2}$

Çözüm / Solution:

$$\begin{aligned} \sqrt{14+2 \cdot 4\sqrt{3}} &= 2\sqrt{2} + b \\ \sqrt{14+2\sqrt{48}} &= 2\sqrt{2} + b \\ \sqrt{8} + \sqrt{6} &= \sqrt{8} + b \\ b &= \sqrt{6} \text{ dir.} \\ 2\sqrt{3} \cdot b &= 2\sqrt{3}\sqrt{6} \\ &= 2\sqrt{18} = 2 \cdot 3\sqrt{2} = 6\sqrt{2} \end{aligned}$$

Yanıt / Answer E

Örnek / Example:

$$\sqrt{5} = x \Rightarrow \sqrt{9-4\sqrt{5}} = ?$$

- A) $x-1$ B) $x-2$ C) $x+1$
D) $x+2$ E) $x+4$

Çözüm / Solution:

$$\begin{aligned} \sqrt{9-2 \cdot 2\sqrt{5}} &= \sqrt{9-2\sqrt{20}} \\ &= \sqrt{5} - \sqrt{4} \\ &= x-2 \end{aligned}$$

Yanıt / Answer B

Örnek / Example:

$$\sqrt{4+2\sqrt{3}} - \sqrt{4-2\sqrt{3}} = ?$$

- A) 1 B) 2 C) 4 D) 6 E) 8

Çözüm / Solution:

$$\begin{aligned} \sqrt{4+2\sqrt{3}} - \sqrt{4-2\sqrt{3}} &= \sqrt{3} + 1 - (\sqrt{3} - 1) \\ &= \sqrt{3} + 1 - \sqrt{3} + 1 \\ &= 2 \end{aligned}$$

Yanıt / Answer B

Örnek / Example:

$$\sqrt{2+\sqrt{3}} - \sqrt{2-\sqrt{3}} = ?$$

- A) $\sqrt{2}$ B) $2\sqrt{2}$ C) 4 D) $4\sqrt{2}$ E) 8

Çözüm / Solution:

$$\begin{aligned} \sqrt{2+\sqrt{3}} - \sqrt{2-\sqrt{3}} \\ &= \left(\sqrt{\frac{3}{2}} + \sqrt{\frac{1}{2}}\right) - \left(\sqrt{\frac{3}{2}} - \sqrt{\frac{1}{2}}\right) \\ &= \sqrt{\frac{3}{2}} + \sqrt{\frac{1}{2}} - \sqrt{\frac{3}{2}} + \sqrt{\frac{1}{2}} \\ &= 2\sqrt{\frac{1}{2}} = \sqrt{4 \cdot \frac{1}{2}} = \sqrt{2} \end{aligned}$$

Yanıt / Answer A

Örnek / Example:

$$\sqrt{40} + \sqrt{\frac{2}{5}} - \sqrt{\frac{5}{2}} = \frac{a\sqrt{40}}{20} \Rightarrow a = ?$$

- A) 9 B) 11 C) 13 D) 15 E) 17

Çözüm / Solution:

$$\begin{aligned} \sqrt{40 \cdot \frac{2}{5}} + \sqrt{\frac{2}{5} \cdot \frac{2}{5}} - \sqrt{\frac{5}{2} \cdot \frac{2}{5}} &= \frac{a \cdot \sqrt{40 \cdot \frac{2}{5}}}{20} \\ \sqrt{16} + \frac{2}{5} - \sqrt{1} &= \frac{4 \cdot a}{20} \\ 3 + \frac{2}{5} &= \frac{a}{5} \\ a &= 17 \end{aligned}$$

Yanıt / Answer E

Örnek / Example:

$$\sqrt{2}\sqrt{3}\dots\sqrt{n} = 2\sqrt{30} \Rightarrow n = ?$$

- A) 2 B) 3 C) 5 D) 8 E) 16

Çözüm / Solution:

$$\sqrt{2 \cdot 3 \cdot 4 \dots n} = \sqrt{4 \cdot 30}$$

$$\sqrt{n!} = \sqrt{120}$$

$$120 = 5!$$

$$n! = 5!$$

$$\Rightarrow n = 5$$

Yanıt / Answer C

Örnek / Example:

$$\frac{1}{\sqrt{3}-\sqrt{2}} - \frac{2}{\sqrt{2}} = ?$$

- A) $\frac{\sqrt{3}}{2}$ B) $\sqrt{3}$ C) $2\sqrt{3}$ D) $3\sqrt{3}$ E) $4\sqrt{3}$

Çözüm / Solution:

$$\frac{1}{\sqrt{3}-\sqrt{2}} - \frac{2}{\sqrt{2}}$$
$$\frac{1}{(\sqrt{3}+\sqrt{2})(\sqrt{2})} - \frac{2}{\sqrt{2}}$$

$$= \frac{\sqrt{3}+\sqrt{2}}{3-2} - \frac{2\sqrt{2}}{2}$$

$$= \sqrt{3} + \sqrt{2} - \sqrt{2} = \sqrt{3}$$

Yanıt / Answer B

Örnek / Example:

$$\frac{4}{\sqrt{5}-1} + \frac{1}{\sqrt{2}-1} - \frac{3}{\sqrt{5}-\sqrt{2}} = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

Çözüm / Solution:

$$\frac{4}{\sqrt{5}-1} + \frac{1}{\sqrt{2}-1} - \frac{3}{\sqrt{5}-\sqrt{2}}$$
$$\frac{4(\sqrt{5}+1)}{(\sqrt{5}+1)(\sqrt{5}-1)} + \frac{\sqrt{2}+1}{(\sqrt{2}+1)(\sqrt{2}-1)} - \frac{3(\sqrt{5}+\sqrt{2})}{(\sqrt{5}+\sqrt{2})(\sqrt{5}-\sqrt{2})}$$

$$= \frac{4(\sqrt{5}+1)}{5-1} + \frac{\sqrt{2}+1}{2-1} - \frac{3(\sqrt{5}+\sqrt{2})}{5-2}$$

$$= \sqrt{5} + 1 + \sqrt{2} + 1 - \sqrt{5} - \sqrt{2} = 2$$

Yanıt / Answer

Örnek / Example:

$$a \cdot b = 9 \Rightarrow \sqrt{a - \frac{3}{b}} \cdot \sqrt{b - \frac{3}{a}} = ?$$

- A) 2 B) 3 C) 4 D) 5 E) 6

Çözüm / Solution:

$$\sqrt{\frac{ab-3}{b}} \cdot \sqrt{\frac{ab-3}{a}} = \sqrt{\frac{6}{b}} \cdot \sqrt{\frac{6}{a}}$$
$$= \sqrt{\frac{36}{9}}$$
$$= \sqrt{4}$$
$$= 2$$

Yanıt / Answer A

Örnek / Example:

$$x+1\sqrt{x-1}\sqrt{81} = \sqrt{3} \Rightarrow x = ?$$

- A) 2 B) 3 C) 4 D) 5 E) 6

Çözüm / Solution:

$$x+1\sqrt{x-1}\sqrt{81} = \sqrt{3}$$

$$x^2-1\sqrt{3^4} = \sqrt{3}$$

$$3\frac{4}{x^2-1} = 3\frac{1}{2}$$

$$\frac{4}{x^2-1} = \frac{1}{2}$$

$$x^2-1=8$$

$$x^2=9$$

$$x=3$$

Yanıt / Answer B

Örnek / Example:

$$\sqrt{\frac{30}{2^{2-3x}} + 2^{3x-1}} = 8 \Rightarrow x = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

Çözüm / Solution:

$$\sqrt{\frac{30}{2^{2-3x}} + 2^{3x-1}} = 8$$

$$\sqrt{\frac{30 + 2^{3x-1+2-3x}}{2^{2-3x}}} = 8$$

$$\sqrt{\frac{30 + 2^1}{2^{2-3x}}} = 8$$

$$\sqrt{\frac{32}{2^{2-3x}}} = 8$$

$$\frac{32}{2^{2-3x}} = 64$$

$$\frac{2^5}{2^{2-3x}} = 2^6$$

$$2^{5-2+3x} = 2^6$$

$$3 + 3x = 6$$

$$x = 1$$

Yanıt / Answer A

Örnek / Example:

$$\sqrt{x^3 \sqrt{x^2}} = 32 \Rightarrow x = ?$$

- A) 6 B) 8 C) 16 D) 32 E) 64

Çözüm / Solution:

$$\sqrt{x^3 \sqrt{x^2}} = 32$$

$$\sqrt[6]{x^3 x^2} = 32$$

$$x^{\frac{5}{6}} = 2^5$$

$$x = 2^{\frac{5 \cdot 6}{5}}$$

$$x = 2^6 = 64$$

Yanıt / Answer D

Örnek / Example:

$$\sqrt{a + \sqrt{2 + \sqrt{a + \sqrt{2 + \dots}}}} = 3 \Rightarrow a = ?$$

- A) $3 - \sqrt{3}$ B) $9 - \sqrt{5}$ C) $3 + \sqrt{5}$
D) $9 + \sqrt{5}$ E) $12 + \sqrt{5}$

Çözüm / Solution:

$$\sqrt{a + \sqrt{2 + \sqrt{a + \sqrt{2 + \dots}}}} = 3$$

$$\sqrt{a + \sqrt{2 + 3}} = 3$$

$$a + \sqrt{5} = 9$$

$$a = 9 - \sqrt{5}$$

Yanıt / Answer B

Örnek / Example:

$$a - \sqrt{a} = 8 \Rightarrow \sqrt{a} - \frac{8}{\sqrt{a}} = ?$$

- A) 1 B) 2 C) 8 D) 9 E) 16

Çözüm / Solution:

$$\sqrt{a^2} - \sqrt{a} = 8$$

$$\Rightarrow \sqrt{a} \cdot (\sqrt{a} - 1) = 8$$

$$\sqrt{a} - 1 = \frac{8}{\sqrt{a}}$$

$$\sqrt{a} - \frac{8}{\sqrt{a}} = 1$$

Yanıt / Answer A

Örnek / Example:

$$\sqrt{\frac{6^8 + 12^8}{6^8 + 3^8}} = ?$$

- A) 2 B) 4 C) 8 D) 16 E) 32

Çözüm / Solution:

$$\sqrt{\frac{6^8 + 12^8}{6^8 + 3^8}} = \sqrt{\frac{6^8 + 2^8 \cdot 6^8}{3^8 \cdot 2^8 + 3^8}}$$

$$= \sqrt{\frac{6^8 \cdot (1 + 2^8)}{3^8 (1 + 2^8)}}$$

$$= \sqrt{\frac{6^8}{3^8}}$$

$$= \sqrt{2^8}$$

$$= 2^4$$

$$= 16$$

Yanıt / Answer D

ÇÖZÜMLÜ TEST / TEST WITH SOLUTIONS

1. $3\sqrt{147} + 2\sqrt{75} - 5\sqrt{108} = ?$

- A) 0 B) $\sqrt{3}$ C) $-2\sqrt{7}$
D) $2\sqrt{7}$ E) $6\sqrt{3}$

Çözüm / Solution:

$$\begin{aligned} & 3 \cdot \sqrt{147} + 2 \cdot \sqrt{75} - 5 \cdot \sqrt{108} \\ &= 3 \cdot \sqrt{49 \cdot 3} + 2 \cdot \sqrt{25 \cdot 3} - 5 \cdot \sqrt{36 \cdot 3} \\ &= 3 \cdot 7 \cdot \sqrt{3} + 2 \cdot 5 \cdot \sqrt{3} - 5 \cdot 6 \cdot \sqrt{3} \\ &= 21\sqrt{3} + 10\sqrt{3} - 30\sqrt{3} \\ &= (21 + 10 - 30) \cdot \sqrt{3} \\ &= \sqrt{3} \end{aligned}$$

Yanıt / Answer B

2. $3\sqrt{40} - \sqrt{250} + \frac{20}{\sqrt{10}} = ?$

- A) $\sqrt{10}$ B) $3\sqrt{10}$ C) $5\sqrt{10}$ D) $2\sqrt{20}$ E) $\sqrt{50}$

Çözüm / Solution:

$$\begin{aligned} & 3\sqrt{40} - \sqrt{250} + \frac{20}{\sqrt{10}} \\ &= 3 \cdot \sqrt{4 \cdot 10} - \sqrt{25 \cdot 10} + \frac{20 \cdot \sqrt{10}}{10} \\ &= 3 \cdot 2 \cdot \sqrt{10} - 5 \cdot \sqrt{10} + 2 \cdot \sqrt{10} \\ &= 6\sqrt{10} - 5\sqrt{10} + 2\sqrt{10} \\ &= (6 - 5 + 2) \sqrt{10} = 3\sqrt{10} \end{aligned}$$

Yanıt / Answer B

3. $18\sqrt{\frac{8}{27}} - \sqrt{150} = ?$

- A) 0 B) $-\sqrt{6}$ C) $\sqrt{6}$ D) $2 - \sqrt{3}$ E) $2\sqrt{3}$

Çözüm / Solution:

$$\begin{aligned} 18\sqrt{\frac{8}{27}} - \sqrt{150} &= 18 \cdot \frac{\sqrt{4 \cdot 2}}{\sqrt{9 \cdot 3}} - \sqrt{25 \cdot 6} \\ &= 18 \cdot \frac{2\sqrt{2}}{3\sqrt{3}} - 5\sqrt{6} \\ &= 12 \cdot \frac{\sqrt{2}}{\sqrt{3}} - 5\sqrt{6} \\ &= 12 \cdot \frac{\sqrt{6}}{3} - 5\sqrt{6} = -\sqrt{6} \end{aligned}$$

Yanıt / Answer

4. $\frac{1}{2}\sqrt{32} - \frac{1}{3}\sqrt{18} + \frac{\sqrt{6}}{\sqrt{3}} = ?$

- A) 0 B) -1 C) $\sqrt{2}$ D) $2\sqrt{2}$ E) $\sqrt{3}$

Çözüm / Solution:

$$\begin{aligned} \frac{1}{2}\sqrt{32} - \frac{1}{3}\sqrt{18} + \frac{\sqrt{6}}{\sqrt{3}} &= \frac{1}{2} \cdot \sqrt{16 \cdot 2} - \frac{1}{3} \cdot \sqrt{9 \cdot 2} + \frac{\sqrt{18}}{3} \\ &= \frac{1}{2} \cdot 4 \cdot \sqrt{2} - \frac{1}{3} \cdot 3 \cdot \sqrt{2} + \frac{3 \cdot \sqrt{2}}{3} \\ &= 2\sqrt{2} - \sqrt{2} + \sqrt{2} = 2\sqrt{2} \end{aligned}$$

Yanıt / Answer D

5. $\sqrt{\frac{1}{16} + \frac{1}{9}} \cdot \sqrt{\frac{1}{9} - \frac{1}{25}} = ?$

- A) 1 B) $\frac{1}{3}$ C) 16 D) $\frac{1}{9}$ E) $\frac{1}{20}$

Çözüm / Solution:

$$\begin{aligned} \sqrt{\frac{1}{16} + \frac{1}{9}} \cdot \sqrt{\frac{1}{9} - \frac{1}{25}} &= \sqrt{\frac{25}{144}} \cdot \sqrt{\frac{16}{225}} \\ &= \frac{5}{12} \cdot \frac{4}{15} = \frac{20}{180} = \frac{1}{9} \end{aligned}$$

Yanıt / Answer D

$$6. \frac{\sqrt{28} + \sqrt{63} + \sqrt{7}}{\sqrt{150} + \sqrt{24}} = ?$$

- A) $\sqrt{6}$ B) $\sqrt{7}$ C) $\sqrt{\frac{6}{7}}$
D) 6 E) 7

Çözüm / Solution:

$$\begin{aligned} \frac{\sqrt{28} + \sqrt{63} + \sqrt{7}}{\sqrt{150} + \sqrt{24}} &= \frac{\sqrt{4 \cdot 7} + \sqrt{9 \cdot 7} + \sqrt{7}}{\sqrt{25 \cdot 6} + \sqrt{4 \cdot 6}} \\ &= \frac{2 \cdot \sqrt{7} + 3 \cdot \sqrt{7} + \sqrt{7}}{5 \cdot \sqrt{6} + 2 \cdot \sqrt{6}} \\ &= \frac{(2+3+1) \cdot \sqrt{7}}{(5+2) \cdot \sqrt{6}} \\ &= \frac{6 \cdot \sqrt{7}}{7 \cdot \sqrt{6}} \\ &= \frac{6\sqrt{7} \cdot \sqrt{6}}{7 \cdot \sqrt{6} \cdot \sqrt{6} \cdot \sqrt{7}} \\ &= \frac{6 \cdot 7 \cdot \sqrt{6}}{7 \cdot 6 \cdot \sqrt{7}} = \sqrt{\frac{6}{7}} \end{aligned}$$

Yanıt / Answer C

$$7. \sqrt{0,09} + \sqrt{0,25} + \sqrt{0,0016} = ?$$

- A) $\frac{21}{25}$ B) $\frac{21}{35}$ C) $\frac{25}{35}$ D) $\frac{25}{45}$ E) 0

Çözüm / Solution:

$$\begin{aligned} \sqrt{0,09} + \sqrt{0,25} + \sqrt{0,0016} &= \sqrt{\frac{9}{100}} + \sqrt{\frac{25}{100}} + \sqrt{\frac{16}{10000}} \\ &= \frac{3}{10} + \frac{5}{10} + \frac{4}{100} \\ &= \frac{30 + 50 + 4}{100} \\ &= \frac{84}{100} = \frac{21}{25} \end{aligned}$$

Yanıt / Answer A

$$8. \frac{10}{\sqrt{5}} - \frac{8}{\sqrt{20}} - \sqrt{\frac{1}{5}} = ?$$

- A) $5\sqrt{5}$ B) $\sqrt{5}$ C) $\frac{1}{5}$ D) $\frac{1}{\sqrt{5}}$ E) 5

Çözüm / Solution:

$$\begin{aligned} \frac{10}{\sqrt{5}} - \frac{8}{\sqrt{20}} - \sqrt{\frac{1}{5}} &= \frac{10 \cdot \sqrt{5}}{5} - \frac{8 \cdot \sqrt{20}}{20} - \frac{\sqrt{5}}{5} \\ &= 2\sqrt{5} - \frac{4\sqrt{5}}{5} - \frac{\sqrt{5}}{5} \\ &= 2\sqrt{5} - \frac{5\sqrt{5}}{5} = 2\sqrt{5} - \sqrt{5} = \sqrt{5} \end{aligned}$$

Yanıt / Answer B

$$9. 3 \cdot \sqrt{\frac{5}{4}} + 2\sqrt{5} + 5 \cdot \sqrt{\frac{125}{4}} = ?$$

- A) $6\sqrt{3}$ B) $9\sqrt{5}$ C) $12\sqrt{5}$ D) $15\sqrt{5}$ E) $16\sqrt{5}$

Çözüm / Solution:

$$\begin{aligned} \frac{3\sqrt{5}}{2} + \frac{2\sqrt{5}}{1} + \frac{5\sqrt{125}}{2} &= \frac{3\sqrt{5} + 4\sqrt{5} + 5\sqrt{25 \cdot 5}}{2} \\ &= \frac{32\sqrt{5}}{2} = 16\sqrt{5} \end{aligned}$$

Yanıt / Answer E

$$10. \frac{2\sqrt{5}}{\sqrt{5}-\sqrt{3}} = ?$$

- A) 10 B) $5 - \sqrt{15}$ C) $3 + \sqrt{3}$
D) $3\sqrt{5}$ E) $5 + \sqrt{15}$

Çözüm / Solution:

$$\begin{aligned} \frac{2\sqrt{5}}{\sqrt{5}-\sqrt{3}} &= \frac{2 \cdot \sqrt{5} (\sqrt{5} + \sqrt{3})}{5-3} \\ &= \frac{2 \cdot \sqrt{5} (\sqrt{5} + \sqrt{3})}{2} = \sqrt{5} \cdot (\sqrt{5} + \sqrt{3}) = 5 + \sqrt{15} \end{aligned}$$

Yanıt / Answer E

11. $4 \cdot \sqrt{\frac{3}{2}} - \sqrt{54} + 3 \cdot \sqrt{\frac{2}{3}} = ?$

- A) 6 B) $\sqrt{6}$ C) $-\sqrt{6}$ D) 0 E) $6\sqrt{6}$

Çözüm / Solution:

$$\begin{aligned} 4 \cdot \frac{\sqrt{3}}{\sqrt{2}} - \sqrt{54} + 3 \cdot \frac{\sqrt{2}}{\sqrt{3}} &= \frac{4 \cdot \sqrt{6}}{2} - \sqrt{9 \cdot 6} + \frac{3 \cdot \sqrt{6}}{3} \\ &= 2 \cdot \sqrt{6} - 3 \cdot \sqrt{6} + \sqrt{6} \\ &= 3\sqrt{6} - 3\sqrt{6} = 0 \end{aligned}$$

Yanıt / Answer D

12. $\sqrt{1,44} - \sqrt{19,6} + \sqrt{\frac{490}{25}} = ?$

- A) 0,2 B) 0,9 C) 1 D) 1,2 E) 1,4

Çözüm / Solution:

$$\begin{aligned} \sqrt{\frac{144}{100}} - \sqrt{\frac{196}{10}} + \sqrt{\frac{490}{25}} &= \frac{12}{10} - \frac{14}{\sqrt{10}} + \frac{7\sqrt{10}}{5} \\ &= \frac{12}{10} - \frac{14 \cdot \sqrt{10}}{10} + \frac{7 \cdot \sqrt{10}}{5} \\ &= \frac{12}{10} - \frac{7\sqrt{10}}{5} + \frac{7\sqrt{10}}{5} = \frac{12}{10} = 1,2 \end{aligned}$$

Yanıt / Answer D

13. $\left(1 - \frac{1}{\sqrt{2}}\right) \cdot \left(\frac{1}{2 - \sqrt{2}}\right) = ?$

- A) $\frac{1}{2}$ B) $\frac{1}{\sqrt{2}}$ C) 1 D) $\sqrt{2}$ E) 2

Çözüm / Solution:

$$\begin{aligned} \left(1 - \frac{1}{\sqrt{2}}\right) \cdot \left(\frac{1}{2 - \sqrt{2}}\right) &= \left(1 - \frac{\sqrt{2}}{2}\right) \cdot \left(\frac{1}{2 - \sqrt{2}}\right) \\ &= \frac{2 - \sqrt{2}}{2} \cdot \frac{1}{2 - \sqrt{2}} \\ &= \frac{1}{2} \end{aligned}$$

Yanıt / Answer A

14. $\frac{2}{1 - \frac{\sqrt{2}}{1 - \frac{1}{\sqrt{2}-1}}}} = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

Çözüm / Solution:

$$\begin{aligned} \frac{2}{1 - \frac{\sqrt{2}}{1 - \frac{1}{\sqrt{2}-1}}}} &= \frac{2}{1 - \frac{\sqrt{2}}{1 - \frac{\sqrt{2}+1}{1}}} \\ &= \frac{2}{1 - \frac{\sqrt{2}}{1 - \sqrt{2} - 1}} \\ &= \frac{2}{1 - \frac{\sqrt{2}}{-\sqrt{2}}} \\ &= \frac{2}{1+1} = 1 \end{aligned}$$

Yanıt / Answer D

15. $\frac{\sqrt{45} + \sqrt{20}}{4\sqrt{20} - \sqrt{5}} = ?$

- A) $\frac{5}{4}$ B) $\frac{5}{3}$ C) $\frac{5}{2}$ D) $\frac{5}{6}$ E) $\frac{5}{7}$

Çözüm / Solution:

$$\begin{aligned} \frac{\sqrt{45} + \sqrt{20}}{4\sqrt{20} - \sqrt{5}} &= \frac{\sqrt{9 \cdot 5} + \sqrt{4 \cdot 5}}{4 \cdot \sqrt{4 \cdot 5} - \sqrt{5}} \\ &= \frac{3 \cdot \sqrt{5} + 2 \cdot \sqrt{5}}{8 \cdot \sqrt{5} - \sqrt{5}} \\ &= \frac{5 \cdot \sqrt{5}}{7 \cdot \sqrt{5}} \\ &= \frac{5}{7} \end{aligned}$$

Yanıt / Answer E

16. $\frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}} - 2\sqrt{6} = ?$

- A) 1 B) 2 C) $\sqrt{6}$ D) 4 E) 5

Çözüm / Solution:

$$\begin{aligned} \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}} - 2\sqrt{6} &= \frac{(\sqrt{3} + \sqrt{2})(\sqrt{3} + \sqrt{2})}{(\sqrt{3} - \sqrt{2})(\sqrt{3} + \sqrt{2})} - 2\sqrt{6} \\ &= \frac{3 + \sqrt{6} + \sqrt{6} + 2}{1} - 2\sqrt{6} \\ &= 5 + 2\sqrt{6} - 2\sqrt{6} \\ &= 5 \end{aligned}$$

Yanıt / Answer E

17. $\sqrt{2} + \sqrt{3} - \frac{1}{\sqrt{2} + \sqrt{3}} = ?$

- A) $-2\sqrt{2}$ B) $-\sqrt{2}$ C) $2\sqrt{2}$
D) $3\sqrt{2}$ E) $4\sqrt{2}$

Çözüm / Solution:

$$\begin{aligned} \sqrt{2} + \sqrt{3} - \frac{1}{\sqrt{2} + \sqrt{3}} &= \frac{(\sqrt{2} + \sqrt{3})(\sqrt{2} - \sqrt{3})}{(\sqrt{2} + \sqrt{3})(\sqrt{2} - \sqrt{3})} \\ &= \sqrt{2} + \sqrt{3} - \frac{(\sqrt{2} - \sqrt{3})}{-1} \\ &= \sqrt{2} + \sqrt{3} + \sqrt{2} - \sqrt{3} = 2\sqrt{2} \end{aligned}$$

Yanıt / Answer C

18. $\frac{10}{\sqrt[3]{25}} = ?$

- A) $\sqrt{5}$ B) $\sqrt[3]{5}$ C) $2\sqrt[3]{5}$
D) $-\sqrt[3]{5}$ E) $5\sqrt[3]{5}$

Çözüm / Solution:

$$\frac{10}{\sqrt[3]{25}} = \frac{10}{\sqrt[3]{5^2}} = \frac{10 \cdot \sqrt[3]{5}}{5} = 2\sqrt[3]{5}$$

Yanıt / Answer C

19. $\frac{1}{\sqrt{3} + 1} - \frac{3}{\sqrt{3} - 1} + \frac{3}{\sqrt{3}} = ?$

- A) $-2\sqrt{3}$ B) -2 C) 1
D) 2 E) $2\sqrt{3}$

Çözüm / Solution:

$$\begin{aligned} \frac{1}{\sqrt{3} + 1} - \frac{3}{\sqrt{3} - 1} + \frac{3}{\sqrt{3}} &= \frac{\sqrt{3} - 1}{3 - 1} - \frac{3(\sqrt{3} + 1)}{3 - 1} + \frac{3\sqrt{3}}{3} \\ &= \frac{\sqrt{3} - 1}{2} - \frac{3(\sqrt{3} + 1)}{2} + \sqrt{3} \\ &= \frac{\sqrt{3} - 1 - 3\sqrt{3} - 3}{2} + \sqrt{3} \\ &= \frac{-2\sqrt{3} - 4}{2} + \sqrt{3} \\ &= \frac{2(-\sqrt{3} - 2)}{2} + \sqrt{3} \\ &= -\sqrt{3} - 2 + \sqrt{3} \\ &= -2 \end{aligned}$$

Yanıt / Answer B

20. $x + y = 0 \Rightarrow (x + \sqrt{x^2 + 1}) \cdot (y + \sqrt{y^2 + 1}) = ?$

- A) 1 B) $x^2 - 1$ C) $2x^2 - 1$
D) -1 E) $2x^2$

Çözüm / Solution:

$$\begin{aligned} x + y = 0 &\Rightarrow y = -x \\ &= (x + \sqrt{x^2 + 1})(-x + \sqrt{x^2 + 1}) \\ &= (\sqrt{x^2 + 1})^2 - x^2 \\ &= x^2 + 1 - x^2 = 1 \end{aligned}$$

Yanıt / Answer A

21. $\frac{\sqrt{\frac{0,4}{10}}}{\sqrt{0,04} - \sqrt{0,16}} = ?$

- A) 4 B) 2 C) 0,5 D) -1 E) -1,5

Çözüm / Solution:

$$\frac{\sqrt{\frac{0,4}{10}}}{\sqrt{0,04} - \sqrt{0,16}} = \frac{\sqrt{0,04}}{\sqrt{0,04} - \sqrt{0,16}} = \frac{0,2}{0,2 - 0,4} = \frac{0,2}{-0,2} = -1$$

Yanıt / Answer D

22. $\frac{\sqrt{0,64} - \sqrt{1,96}}{\sqrt{0,36}} + 1 = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

Çözüm / Solution:

$$\frac{\sqrt{0,64} - \sqrt{1,96}}{\sqrt{0,36}} + 1 = \frac{\sqrt{(0,8)^2} - \sqrt{(1,4)^2}}{\sqrt{(0,6)^2}} + 1 = \frac{0,8 - 1,4}{0,6} + 1 = \frac{-0,6}{0,6} + 1 = -1 + 1 = 0$$

Yanıt / Answer C

23. $\sqrt{(0,6)^{-1} \cdot 6^{-1}} : (1,3)^{-1} = ?$

- A) 3 B) 2 C) $\frac{1}{2}$ D) $\frac{2}{3}$ E) $\frac{3}{8}$

Çözüm / Solution:

$$\sqrt{(0,6)^{-1} \cdot 6^{-1}} : (1,3)^{-1} = \sqrt{\left(\frac{6}{9}\right)^{-1} \cdot \frac{1}{6}} : \left(\frac{13-1}{9}\right)^{-1} = \sqrt{\frac{9}{6} \cdot \frac{1}{6}} : \frac{9}{12} = \sqrt{\frac{9}{36}} \cdot \frac{12}{9} = \frac{3}{6} \cdot \frac{12}{9} = \frac{2}{3}$$

Yanıt / Answer D

24. $\sqrt{(-2)^{-4}} + \left(\frac{1}{3}\right)^{-1} - \sqrt[3]{-8} = ?$

- A) 5,25 B) -1,25 C) 5
D) 1,25 E) 9

Çözüm / Solution:

$$\sqrt{(-2)^{-4}} + \left(\frac{1}{3}\right)^{-1} - \sqrt[3]{-8} = \sqrt{\frac{1}{(-2)^4}} + 3 - \sqrt[3]{(-2)^3} = \sqrt{\frac{1}{16}} + 3 - (-2) = \frac{1}{4} + 3 + 2 = \frac{1}{4} + 5 = \frac{21}{4} = 5,25$$

Yanıt / Answer /

25. $\frac{\sqrt{7 + \frac{1}{9}}}{0,13} = ?$

- A) 10 B) 15 C) 18 D) 20 E) 30

Çözüm / Solution:

$$\frac{\sqrt{7 + \frac{1}{9}}}{0,13} = \frac{\sqrt{\frac{64}{9}}}{\frac{13-1}{90}} = \frac{\frac{8}{3}}{\frac{12}{90}} = \frac{8}{3} \cdot \frac{90}{12} = 20$$

Yanıt / Answer D

26. $\frac{2}{\sqrt[7]{8}} = ?$

- A) $\sqrt[7]{2}$ B) $\sqrt[7]{4}$ C) $\sqrt[7]{8}$
D) $\sqrt[7]{16}$ E) $\sqrt[7]{32}$

Çözüm / Solution:

$$\frac{2}{\sqrt[7]{8}} = \frac{2}{\sqrt[7]{2^3}} = \frac{2}{2^{\frac{3}{7}}} = 2^{(1 - \frac{3}{7})} = 2^{\frac{4}{7}} = \sqrt[7]{2^4} = \sqrt[7]{16}$$

Yanıt / Answer D

27. $\sqrt{2} \cdot {}^3\sqrt{3} = ?$

- A) ${}^6\sqrt{6}$ B) ${}^6\sqrt{36}$ C) ${}^6\sqrt{48}$
D) ${}^6\sqrt{54}$ E) ${}^6\sqrt{72}$

Çözüm / Solution:

$$\sqrt{2} \cdot {}^3\sqrt{3} = {}^6\sqrt{2^3} \cdot {}^6\sqrt{3^2} \\ = {}^6\sqrt{8} \cdot {}^6\sqrt{9} = {}^6\sqrt{72}$$

Yanıt / Answer E

28. $\frac{\sqrt{2}}{\sqrt{2 + \frac{1}{\sqrt{2 + \frac{1}{\sqrt{2}}}}}} = ?$

- A) $\frac{2}{3}$ B) $\frac{3}{4}$ C) $\frac{4}{5}$ D) $\frac{5}{4}$ E) $\frac{4}{3}$

Çözüm / Solution:

$$\frac{\sqrt{2}}{\sqrt{2 + \frac{1}{\sqrt{2 + \frac{1}{\sqrt{2}}}}}} = \frac{\sqrt{2}}{\sqrt{2 + \frac{1}{\frac{3}{\sqrt{2}}}}} = \frac{\sqrt{2}}{\sqrt{2 + \frac{\sqrt{2}}{3}}} \\ = \frac{\sqrt{2}}{\frac{4\sqrt{2}}{3}} = \sqrt{2} \cdot \frac{3}{4\sqrt{2}} = \frac{3}{4}$$

Yanıt / Answer B

29. $\frac{\sqrt{(-4)^2} + 3\sqrt{9} - \sqrt{(-3)^2}}{\sqrt{(-1)^2} + \sqrt{16}} = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

Çözüm / Solution:

$$\frac{\sqrt{(-4)^2} + 3\sqrt{9} - \sqrt{(-3)^2}}{\sqrt{(-1)^2} + \sqrt{16}} = \frac{4 + 9 - 3}{1 + 4} \\ = \frac{10}{5} \\ = 2$$

Yanıt / Answer B

YÖS SORULARI / YÖS QUESTIONS

1. $\left. \begin{array}{l} a = \sqrt{5-1} \\ b = \sqrt{5+1} \end{array} \right\} \Rightarrow \left(\frac{1}{a} - \frac{1}{b} \right)^{\frac{1}{2}} = ?$

- A) $\frac{\sqrt{2}}{2}$ B) $\frac{\sqrt{3}}{4}$ C) $2\sqrt{2}$
D) $2\sqrt{3}$ E) $4\sqrt{2}$

(YÖS 1994)

Çözüm / Solution:

$$\left(\frac{1}{a} - \frac{1}{b} \right)^{\frac{1}{2}} = \left(\frac{1}{\sqrt{5-1}} - \frac{1}{\sqrt{5+1}} \right)^{\frac{1}{2}}$$

$$\frac{1}{\sqrt{5-1}} = \frac{1}{\sqrt{5-1}} \cdot \frac{\sqrt{5+1}}{\sqrt{5+1}} = \frac{\sqrt{5+1}}{5-1} = \frac{\sqrt{5+1}}{4}$$

$$\frac{1}{\sqrt{5+1}} = \frac{1}{\sqrt{5+1}} \cdot \frac{\sqrt{5-1}}{\sqrt{5-1}} = \frac{\sqrt{5-1}}{5-1} = \frac{\sqrt{5-1}}{4}$$

$$\left(\frac{1}{\sqrt{5-1}} - \frac{1}{\sqrt{5+1}} \right)^{\frac{1}{2}} = \left(\frac{\sqrt{5+1}}{4} - \frac{\sqrt{5-1}}{4} \right)^{\frac{1}{2}}$$

$$= \left(\frac{\sqrt{5+1} - \sqrt{5-1}}{4} \right)^{\frac{1}{2}} = \left(\frac{2}{4} \right)^{\frac{1}{2}} = \sqrt{\frac{1}{2}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

Yanıt / Answer A

2. $\frac{3}{\sqrt{7}-\sqrt{5}} - \frac{3}{\sqrt{7}+\sqrt{5}} = 3p \Rightarrow p = ?$

- A) 2 B) 2 C) $\sqrt{2}$ D) $\sqrt{3}$ E) $\sqrt{5}$

(YÖS 1995)

Çözüm / Solution:

$$\begin{aligned}\frac{3}{\sqrt{7}-\sqrt{5}} &= \frac{3}{\sqrt{7}-\sqrt{5}} \cdot \frac{\sqrt{7}+\sqrt{5}}{\sqrt{7}+\sqrt{5}} \\ &= \frac{3\sqrt{7}+3\sqrt{5}}{7-5} = \frac{3\sqrt{7}+3\sqrt{5}}{2} \\ \frac{3}{\sqrt{7}+\sqrt{5}} &= \frac{3}{\sqrt{7}+\sqrt{5}} \cdot \frac{\sqrt{7}-\sqrt{5}}{\sqrt{7}-\sqrt{5}} \\ &= \frac{3\sqrt{7}-3\sqrt{5}}{7-5} = \frac{3\sqrt{7}-3\sqrt{5}}{2} \\ \frac{3}{\sqrt{7}-\sqrt{5}} - \frac{3}{\sqrt{7}+\sqrt{5}} &= \frac{3\sqrt{7}+3\sqrt{5}}{2} - \frac{3\sqrt{7}-3\sqrt{5}}{2} \\ &= \frac{3\sqrt{7}+3\sqrt{5}-3\sqrt{7}+3\sqrt{5}}{2} \\ &= \frac{6\sqrt{5}}{2} = 3\sqrt{5} = 3p \Rightarrow p = \sqrt{5}\end{aligned}$$

Yanıt / Answer E

3. $\frac{\sqrt{0,81} + \sqrt{0,49}}{\sqrt{2,56} - \sqrt{1,44}} = ?$

- A) 0,4 B) 0,2 C) 1 D) 2 E) 4

Çözüm / Solution:

$$\begin{aligned}\frac{\sqrt{0,81} + \sqrt{0,49}}{\sqrt{2,56} - \sqrt{1,44}} &= \frac{0,9+0,7}{1,6-1,2} \\ &= \frac{1,6}{0,4} = 4\end{aligned}$$

Yanıt / Answer E

4. $\sqrt{3+2\sqrt{2}} - \sqrt{3-2\sqrt{2}} = ?$

- A) $2\sqrt{3}$ B) $\sqrt{3}$ C) $\sqrt{2}$ D) 3 E) 2

Çözüm / Solution:

$$\begin{aligned}\sqrt{3+2\sqrt{2}} - \sqrt{3-2\sqrt{2}} &= \sqrt{(\sqrt{2}+1)^2} - \sqrt{(\sqrt{2}-1)^2} \\ &= \sqrt{2}+1 - (\sqrt{2}-1) \\ &= \sqrt{2}+1 - \sqrt{2}+1 = 2\end{aligned}$$

Yanıt / Answer E

5. $a, b \in \mathbb{Z}$,

$$\sqrt{72} - \sqrt{50} + \sqrt{27} = a\sqrt{2} + b\sqrt{3}$$

$$\Rightarrow 7a - b = ?$$

- A) -3 B) -2 C) 4 D) $2\sqrt{2}$ E) $3\sqrt{3}$
(YÖS 19)

Çözüm / Solution:

$$\sqrt{72} - \sqrt{50} + \sqrt{27} = a\sqrt{2} + b\sqrt{3}$$

$$6\sqrt{2} - 5\sqrt{2} + 3\sqrt{3} = a\sqrt{2} + b\sqrt{3}$$

$$\sqrt{2} + 3\sqrt{3} = a\sqrt{2} + b\sqrt{3}$$

$$\begin{cases} a = 1 \\ b = 3 \end{cases} \Rightarrow 7a - b = 7 - 3 = 4$$

Yanıt / Answer C

6. ${}^3\sqrt{2} \cdot \left({}^3\sqrt{32} - {}^3\sqrt{108} + \frac{6}{{}^3\sqrt{54}} \right) = ?$

- A) ${}^3\sqrt{4}$ B) $2{}^3\sqrt{2}$ C) 4 D) 6 E) 8

(YÖS 1998)

Çözüm / Solution:

$$\begin{aligned}& {}^3\sqrt{2} \cdot \left({}^3\sqrt{32} - {}^3\sqrt{108} + \frac{6}{{}^3\sqrt{54}} \right) \\ &= {}^3\sqrt{2} \cdot \left(3 \cdot 2{}^3\sqrt{4} - 3{}^3\sqrt{4} + \frac{6}{3{}^3\sqrt{2}} \right) \\ &= {}^3\sqrt{2} \cdot \left(\frac{18{}^3\sqrt{8} - 9{}^3\sqrt{8} + 6}{3{}^3\sqrt{2}} \right) \\ &= \frac{18 \cdot 2 - 9 \cdot 2 + 6}{3} \\ &= \frac{18+6}{3} \\ &= \frac{24}{3} \\ &= 8\end{aligned}$$

Yanıt / Answer E

7. $\frac{\sqrt{36}}{\sqrt[4]{81}} = ?$

- A) 5 B) 4 C) 3 D) 2 E) 1

(YÖS 2001)

Çözüm / Solution:

$$\frac{\sqrt[4]{36}}{\sqrt[4]{81}} = \frac{\sqrt[4]{6^2}}{\sqrt[4]{3^4}} = \frac{6}{3} = 2$$

Yanıt / Answer D

8. $\frac{\sqrt[3]{128} + \sqrt[3]{16}}{\sqrt[3]{2}} = ?$

- A) $\sqrt[3]{2}$ B) $2\sqrt[3]{2}$ C) $3\sqrt[3]{2}$ D) 3 E) 6

(YÖS 2002)

Çözüm / Solution:

$$\frac{\sqrt[3]{128} + \sqrt[3]{16}}{\sqrt[3]{2}} = \frac{\sqrt[3]{2^6} + \sqrt[3]{2^4}}{\sqrt[3]{2}} = \frac{2\sqrt[3]{2} + \sqrt[3]{2}}{\sqrt[3]{2}} = \frac{3\sqrt[3]{2}}{\sqrt[3]{2}} = 3$$

Yanıt / Answer E

9. $x^a = \sqrt{5} \Rightarrow x^{-4a} = ?$

- A) $\frac{1}{125}$ B) $\frac{1}{25}$ C) $\frac{1}{5}$ D) 5 E) 25

(YÖS 2003)

Çözüm / Solution:

$$x^a = \sqrt{5} \Rightarrow x^{-4a} = (x^a)^{-4} = (\sqrt{5})^{-4} = \frac{1}{(\sqrt{5})^4} = \frac{1}{25}$$

Yanıt / Answer B

10. $\frac{\sqrt{10}}{\sqrt{2} + \sqrt{6}} + \frac{\sqrt{10}}{\sqrt{6} - \sqrt{2}} = ?$

- A) $\sqrt{2}$ B) $\sqrt{3}$ C) $\sqrt{5}$ D) $\sqrt{15}$ E) $2\sqrt{15}$

(YÖS 2004)

Çözüm / Solution:

$$\begin{aligned} & \frac{\sqrt{10}}{\sqrt{2} + \sqrt{6}} + \frac{\sqrt{10}}{\sqrt{6} - \sqrt{2}} \\ &= \frac{\sqrt{60} - \sqrt{20} + \sqrt{60} + \sqrt{20}}{6 - 2} \\ &= \frac{2\sqrt{60}}{4} \\ &= \frac{8\sqrt{15}}{4} \\ &= 2\sqrt{15} \end{aligned}$$

Yanıt / Answer E

11. $\sqrt{-x+2\sqrt{x-1}} + \sqrt{y-\sqrt{2y-1}} = 0 \Rightarrow x+y = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

(YÖS 2004)

Çözüm / Solution:

$$\begin{aligned} & \sqrt{-x+2\sqrt{x-1}} + \sqrt{y-\sqrt{2y-1}} = 0 \\ & \Rightarrow -x+2\sqrt{x-1} = 0 \quad y-\sqrt{2y-1} = 0 \\ & \quad x = 2\sqrt{x-1} \quad y = \sqrt{2y-1} \\ & (x)^2 = (2\sqrt{x-1})^2 \quad (y)^2 = (\sqrt{2y-1})^2 \\ & \quad x^2 = 4x-4 \quad y^2 = 2y-1 \\ & x^2 - 4x + 4 = 0 \quad y^2 - 2y + 1 = 0 \\ & (x-2)^2 = 0 \quad (y-1)^2 = 0 \\ & \Rightarrow x = 2 \quad \Rightarrow y = 1 \\ & \Rightarrow x + y = 2 + 1 = 3 \end{aligned}$$

Yanıt / Answer B

12. $x = \sqrt{5} + 2$

$y = \sqrt{5} - 2$

$\frac{x}{y} + \frac{y}{x} = ?$

- A) 12 B) 14 C) 16 D) 18 E) 20

(YÖS 2005)

Çözüm / Solution:

$$\frac{\sqrt{5}+2}{\sqrt{5}-2} + \frac{\sqrt{5}-2}{\sqrt{5}+2}$$

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

$$= \frac{7+2\sqrt{5}+7-2\sqrt{5}}{5-4} = 14$$

Yanıt / Answer B

13. $\sqrt{3^x + 72} = 3^x$

$x = ?$

- A) 3 B) 2 C) -1 D) -2 E) -3

(YÖS 2005)

Çözüm / Solution:

$$\sqrt{3^x + 72} = 3^x$$

$$3^x + 72 = 3^{2x}$$

$$\Rightarrow 3^{2x} - 3^x - 72 = 0$$

$$3^x = u \Rightarrow u^2 - u - 72 = 0$$

$$(u-9)(u+8) = 0$$

$$u+8=0 \quad u-9=0$$

$$u=-8 \quad u=9$$

$$3^x \neq -8 \quad 3^x = 9$$

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

Yanıt / Answer B

14. $a = 1 + \sqrt{2}$

$b = 1 - \sqrt{2}$

$\sqrt{(a-b)^2} = ?$

- A) $\sqrt{2}$ B) $2\sqrt{2}$ C) $3\sqrt{2}$ D) 1 E) 2

(YÖS 2006)

Çözüm / Solution:

$$\sqrt{(a-b)^2} = \sqrt{(1+\sqrt{2} - 1+\sqrt{2})^2}$$

$$= \sqrt{(2\sqrt{2})^2}$$

$$= \sqrt{8}$$

$$= 2\sqrt{2}$$

Yanıt / Answer B

15.

$$\sqrt[5]{\frac{4^4 + 4^4 + 4^4 + 4^4}{3^9 + 3^9 + 3^9}} = ?$$

- A) $\frac{2}{3}$ B) $\frac{2}{9}$ C) $\frac{4}{3}$ D) $\frac{4}{9}$ E) $\frac{16}{27}$

(YÖS :

Çözüm / Solution:

$$\sqrt[5]{\frac{4^4(4)}{3^9(3)}} = \sqrt[5]{\frac{4^5}{3^{10}}} = \frac{4}{9}$$

Yanıt / Answer

16. $\sqrt{1,21} - \sqrt{1,44} + \sqrt{1,69} = ?$

- A) 0 B) 1 C) 1,1 D) 1,2 E) 1,3

(YÖS 2007)

Çözüm / Solution:

$$\sqrt{1,21} - \sqrt{1,44} + \sqrt{1,69} = 1,1 - 1,2 + 1,3$$

$$= 1,2$$

Yanıt / Answer D

17. $\sqrt{5+2\sqrt{6}} - \sqrt{2} = ?$

- A) $\sqrt{2}$ B) $\sqrt{3}$ C) $\sqrt{5}$ D) 2 E) 3

(YÖS 2007)

Çözüm / Solution:

$$\sqrt{5+2\sqrt{6}} - \sqrt{2} = \sqrt{3} + \sqrt{2} - \sqrt{2} = \sqrt{3}$$

Yanıt / Answer B

1. $\sqrt{4^2 - 3^2} - \sqrt{(7)^2} = ?$

Yanıt / Answer : 0

2. $\sqrt{1 - \frac{9}{25}} + \sqrt{1 - \frac{11}{36}} = ?$

Yanıt / Answer : $\frac{49}{30}$

3. $3 \cdot \sqrt[3]{2} + 4 \cdot \sqrt[3]{16} - 4 \cdot \sqrt[3]{54} = ?$

Yanıt / Answer : $-\sqrt[3]{2}$

4. $4\sqrt{8} + 5\sqrt{18} - 3\sqrt{72} + \sqrt{50} = ?$

Yanıt / Answer : $10\sqrt{2}$

5. $\frac{\sqrt[3]{16} + \sqrt[3]{54} - \sqrt[3]{250} + \sqrt[3]{128}}{\sqrt[3]{16} - \sqrt[3]{250}} = ?$

Yanıt / Answer : $-\frac{4}{3}$

6. $\sqrt{\frac{3}{2}} + \sqrt{\frac{2}{3}} = ?$

Yanıt / Answer : $\frac{5}{\sqrt{6}}$

7. $\sqrt[4]{2 \sqrt[3]{2 \sqrt{2}}} = ?$

Yanıt / Answer : $\sqrt[8]{8}$

8. $\sqrt{2,25} - \sqrt{1,96} + \sqrt{0,04} = ?$

Yanıt / Answer : 0,3

9. $6 \cdot \sqrt[3]{0,008} - 3 \cdot \sqrt{0,01} - 7 \cdot \sqrt{0,04} = ?$

Yanıt / Answer : $-\frac{1}{2}$

10. $(2 - \sqrt{3}) \cdot \sqrt{7 + 4\sqrt{3}} = ?$

Yanıt / Answer : 1

11. $\frac{5 \cdot \sqrt{\frac{3}{5}} + 3 \cdot \sqrt{\frac{5}{3}}}{\sqrt{5}} = ?$

Yanıt / Answer : $2\sqrt{3}$

12. $A = \sqrt{\sqrt{17} - 4} \Rightarrow A^{-1} = ?$

Yanıt / Answer : $\sqrt{\sqrt{17} + 4}$

13. $\sqrt{12 + \sqrt{23 - \sqrt{46 + \sqrt{11 - \sqrt{4}}}}} = ?$

Yanıt / Answer

14. $\frac{\sqrt{3}}{4 - \frac{2}{2 - \sqrt{3}}} = ?$

Yanıt / Answer : $-\frac{1}{2}$

15. $\sqrt{5 + 2\sqrt{6}} - \frac{1}{2 - \sqrt{3}} = ?$

Yanıt / Answer : $\sqrt{2} - 2$

16. $\sqrt{4 + \sqrt{3}} \cdot \sqrt{8 - 2\sqrt{3}} = ?$

Yanıt / Answer : $\sqrt{26}$

$$17. \sqrt{1,6} - \sqrt{0,4} = \sqrt[3]{a\sqrt{a}} \Rightarrow a = ?$$

Yanıt / Answer : $\frac{2}{5}$

$$18. \frac{\sqrt[5]{2^{12x-6y}}}{\sqrt[5]{2^{5+10x}}} = \frac{1}{8} \Rightarrow y = ?$$

Yanıt / Answer : 2

$$19. \begin{cases} \sqrt{x} + \sqrt{y} = 4 \\ \sqrt{x} - \sqrt{y} = 1 \end{cases} \Rightarrow x - y = ?$$

Yanıt / Answer : 4

$$20. x = 4 + \frac{1}{x} \Rightarrow \sqrt{x^2 + \frac{1}{x^2}} = ?$$

Yanıt / Answer : $3\sqrt{2}$

$$21. \sqrt{m\sqrt{m^3\frac{1}{4}}} = \sqrt{m^3\frac{1}{m}} \Rightarrow m = ?$$

Yanıt / Answer : $\sqrt[5]{4}$

$$22. \begin{cases} a = \sqrt{2} - 2 \\ b = \sqrt{2} - 1 \end{cases} \Rightarrow \frac{a-b}{a+3} + \frac{a-b}{b} = ?$$

Yanıt / Answer : $-2\sqrt{2}$

$$23. \frac{\sqrt{3} - \sqrt{2} - 1}{\sqrt{2} + 1} - \frac{\sqrt{3} - \sqrt{2} + 1}{\sqrt{2} - 1} = ?$$

Yanıt / Answer : $-2\sqrt{3}$

$$24. a\sqrt{5} + b\sqrt{3} = \frac{5}{5\sqrt{3} - 3\sqrt{5}} \Rightarrow b - a = ?$$

Yanıt / Answer : $-\frac{4}{3}$

25. $\sqrt{6 - \sqrt{6 - \sqrt{6 - \sqrt{6 - \dots}}}} = ?$

Yanıt / Answer : 2

26. $\sqrt[3]{49 + \sqrt[3]{49 + \sqrt[3]{49 \dots}}} = x$

$\sqrt{4\sqrt{4\sqrt{4\sqrt{4\dots}}}} = y$

$\Rightarrow x^2 - y = ?$

Yanıt / Answer : 3

27. $\sqrt{7 - 2\sqrt{12}} + \sqrt{8 + 2\sqrt{15}} = ?$

Yanıt / Answer : $2 + \sqrt{5}$

28. $\frac{4}{\sqrt{10 + 2\sqrt{21}}} + \sqrt{3} = ?$

Yanıt / Answer : $\sqrt{7}$

29. $\sqrt{\frac{\sqrt{3}+1}{\sqrt{3}-1}} - \sqrt{\frac{\sqrt{3}-1}{\sqrt{3}+1}} = ?$

Yanıt / Answer : $\sqrt{2}$

30. $\sqrt{a - \sqrt{a - \sqrt{a - \dots}}} = 3 \Rightarrow a = ?$

Yanıt / Answer : 12

31. $\frac{\sqrt{300} - 2\sqrt{27}}{\sqrt{75} + \sqrt{3}} = ?$

Yanıt / Answer : $\frac{2}{3}$

32. $\left. \begin{array}{l} a = \frac{\sqrt{3}+2}{2} \\ b = \frac{2-\sqrt{3}}{2} \end{array} \right\} \Rightarrow \frac{a}{b} + \frac{b}{a} + 3 = ?$

Yanıt / Answer : 25

1. $5^{x+1} = \sqrt{25^{3x}} \Rightarrow x = ?$

- A) 0 B) 1 C) $\frac{1}{2}$ D) $\frac{2}{3}$ E) 4

2. $d^2 = \sqrt{2^{n+2}} \Rightarrow \sqrt[3]{d^6} = ?$

- A) 2^n B) $2^{\frac{1}{2}+n}$ C) $2^{\frac{n+2}{2}}$ D) 2^{n-2} E) 2^{3n+6}

3. $\sqrt{2010 \cdot 1998 + 36} = ?$

- A) 1997 B) 1999 C) 2000 D) 2002 E) 2004

4. $(\sqrt{x+\sqrt{x}} + \sqrt{x-\sqrt{x}}) = 4 \Rightarrow x = ?$

- A) $\frac{9}{4}$ B) $\frac{21}{8}$ C) $\frac{36}{11}$ D) $\frac{64}{15}$ E) $\frac{72}{18}$

5. $x \cdot \sqrt{\frac{4}{3}} = \sqrt{\frac{3}{4}} + \sqrt{\frac{4}{3}} \Rightarrow x = ?$

- A) $\frac{1}{2}$ B) $\frac{3}{5}$ C) $\frac{6}{7}$ D) $\frac{7}{4}$ E) $\frac{8}{5}$

6. $\sqrt{3 \cdot \sqrt[3]{3^x}} = \frac{1}{243} \Rightarrow x = ?$

- A) -3 B) -14 C) -16 D) -18 E) -33

7. $\sqrt{x+\sqrt{x^2}} \cdot \sqrt[3]{x+\sqrt{x^2}} = 16^{\frac{5}{12}} \Rightarrow x = ?$

- A) 0 B) 1 C) 2 D) 3 E) 4

8. $\frac{6-\sqrt{6}}{\sqrt{3}-\sqrt{2}} = ?$

- A) $2\sqrt{3}-\sqrt{2}$ B) $4\sqrt{3}+3\sqrt{2}$ C) $2\sqrt{2}-\sqrt{3}$
D) $\sqrt{3}+\sqrt{2}$ E) $\sqrt{2}-3\sqrt{3}$

9. $\sqrt[3]{3 \cdot \sqrt[3]{729}} = 3 \Rightarrow x = ?$

- A) 0 B) 1 C) 2 D) 3 E) 4

10. $x = \sqrt[3]{\frac{2}{3\sqrt{2}}} \Rightarrow x^{18} = ?$

- A) 8 B) 16 C) 21 D) 32 E) 64

11. $\sqrt{\frac{3^{x+2}}{9^{x-1}}} = 27 \Rightarrow x = ?$

- A) -5 B) -2 C) 2 D) 3 E) 8

12. $\frac{(\sqrt{5}-2) \cdot (\sqrt{9+2\sqrt{20}})}{\sqrt{2}} = ?$

- A) $-\frac{\sqrt{2}}{3}$ B) 1 C) $\frac{\sqrt{2}}{2}$ D) $-\frac{3}{2}$ E) $\frac{\sqrt{3}}{5}$

13. $\sqrt[4]{27} \sqrt[4]{27} \sqrt[4]{27} \dots = x,$

$\sqrt{5} \sqrt{5} \sqrt{5} \dots = y \Rightarrow y^2 - x^2 = ?$

- A) 8 B) 12 C) 16 D) 21 E) 27

14. $\frac{1}{2-3\sqrt{3}} + \frac{1}{2+3\sqrt{3}} = ?$

- A) $-\frac{2}{3}$ B) $-\frac{14}{5}$ C) $-\frac{4}{23}$ D) $-\frac{8}{17}$ E) $\frac{\sqrt{3}}{2}$

15. $\frac{5}{5-\sqrt{5}} \cdot (5+\sqrt{5})^{-1} = ?$

- A) $\frac{1}{2}$ B) $\frac{5}{2}$ C) $\frac{1}{4}$ D) $\frac{4}{7}$ E) $\frac{7}{2}$

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

- A) -1 B) 11 C) -10 D) -11 E) -

17. $\frac{1}{\sqrt{7-4\sqrt{3}}} + \frac{1}{2+\sqrt{3}} = ?$

- A) 2 B) $2\sqrt{3}$ C) 1 D) 4 E) 1

18. $\sqrt{0,16} + \sqrt{0,64} = ?$

- A) $\frac{3}{2}$ B) $\frac{6}{5}$ C) $\frac{4}{5}$ D) $\frac{9}{10}$ E) $\frac{12}{7}$

19. $\sqrt{\frac{3^{-1}}{0,3} : \frac{0,09}{10}} = ?$

- A) $\frac{10}{3}$ B) $\frac{10}{9}$ C) $(\frac{9}{10})^{-2}$ D) $(\frac{3}{10})^{-2}$ E) $\frac{3}{5}$

20. $\sqrt{6+\sqrt{6+\sqrt{6+\sqrt{6+\dots}}}} = \sqrt{x} : \sqrt{x} : \sqrt{x} : \dots = n = ?$

- A) 8 B) 12 C) 16 D) 27 E) 64

Yanıtlar / Answers

1. C	2. C	3. E	4. D	5. D	6. E
7. C	8. B	9. D	10. B	11. B	12. C
13. C	14. C	15. C	16. A	17. D	18. B
19. D	20. D				

1. $4\sqrt{8} + 5\sqrt{18} - 3\sqrt{72} + \sqrt{50} = ?$

- A) $6\sqrt{2}$ B) $7\sqrt{2}$ C) $8\sqrt{2}$
 D) $9\sqrt{2}$ E) $10\sqrt{2}$

2. $\sqrt{108} - \sqrt{48} - \sqrt{75} = ?$

- A) $\sqrt{3}$ B) $-3\sqrt{3}$ C) $2\sqrt{3}$
 D) $-\sqrt{3}$ E) 0

3. $3^3\sqrt{2} + 4^3\sqrt{16} - 4^3\sqrt{54} = ?$

- A) $-2^3\sqrt{2}$ B) $-^3\sqrt{3}$ C) $-^3\sqrt{2}$
 D) $^3\sqrt{3}$ E) $2^3\sqrt{3}$

4. $^3\sqrt{0,006} + ^3\sqrt{0,002} = ?$

- A) $\frac{^3\sqrt{2} (^3\sqrt{2} + 1)}{10}$ B) $\frac{^3\sqrt{2} (^3\sqrt{3} + 1)}{10}$
 C) $\frac{^3\sqrt{3} (^3\sqrt{2} - 1)}{10}$ D) $\frac{^3\sqrt{3} (^3\sqrt{2} + 1)}{10}$

E) $^3\sqrt{5} + \sqrt{2}$

5. $\sqrt{1 - \frac{9}{25}} + \sqrt{1 - \frac{11}{36}} = ?$

- A) $\frac{37}{25}$ B) $\frac{27}{25}$ C) $\frac{49}{30}$ D) $\frac{51}{25}$ E) $\frac{49}{16}$

6. $\sqrt{4^2 - 3^2} - ^4\sqrt{7^2} = ?$

- A) 0 B) 1 C) 2 D) 3 E) 40

7. $\frac{^3\sqrt{16} + ^3\sqrt{54} - ^3\sqrt{250} + ^3\sqrt{128}}{^3\sqrt{16} - ^3\sqrt{250}} = ?$

- A) $-\frac{1}{2}$ B) $-\frac{2}{3}$ C) $-\frac{3}{4}$ D) $-\frac{4}{3}$ E) $-\frac{5}{4}$

8. $3\sqrt{2} + 4\sqrt{8} - 5\sqrt{50} + 8\sqrt{32} = ?$

- A) $10\sqrt{2}$ B) $12\sqrt{2}$ C) $4\sqrt{3}$
 D) $16\sqrt{2}$ E) $18\sqrt{2}$

9. $2^3\sqrt{3} - 3^3\sqrt{24} + 4^3\sqrt{81} = ?$

- A) $^3\sqrt{3}$ B) $2^3\sqrt{3}$ C) $4^3\sqrt{3}$
 D) $6^3\sqrt{2}$ E) $8^3\sqrt{3}$

10. $x > 0, y > 0, z > 0 \Rightarrow$

$$6\sqrt{xy^2z^2} + \frac{8}{z}\sqrt{xy^2z^4} - \frac{6}{y}\sqrt{xy^4z^2} = ?$$

- A) $8yz\sqrt{x}$ B) $6yz\sqrt{x}$ C) $\sqrt{x^2-1}$
 D) $\sqrt{x-1}$ E) $6y\sqrt{x-1}$

11. $x > 1 \Rightarrow \sqrt{(x+1)^3} - x\sqrt{x+1} + \sqrt{(x-1)(x^2-1)} = ?$

- A) $x\sqrt{x+1}$ B) $\sqrt{x+1}$ C) $\sqrt{x^2-1}$
 D) $\sqrt{x-1}$ E) $x\sqrt{x-1}$

12. $\sqrt{\frac{3}{2}} + \sqrt{\frac{2}{3}} = ?$

A) $\frac{\sqrt{3}}{6}$

B) $6\sqrt{\frac{6}{5}}$

C) $3\frac{\sqrt{6}}{2}$

D) $\frac{5}{\sqrt{6}}$

E) $2\sqrt{6}$

13. $\sqrt{0,04} - 2^3\sqrt{0,008} - 4\sqrt{0,0016} + \sqrt{1,69} = ?$

A) 0,5

B) 0,6

C) 0,7

D) 0,8

E) 0,9

14. $\frac{1}{\sqrt[3]{a^2}} = ?$

A) $\sqrt[3]{a^2}$

B) $\sqrt[3]{a}$

C) $\frac{\sqrt[3]{a}}{a}$

D) $\frac{\sqrt[3]{a^2}}{a}$

E) $\sqrt{a}$

15. $\sqrt{a} \cdot \sqrt[3]{b} \cdot \frac{1}{\sqrt[3]{ab}} = ?$

A) 1

B) $\sqrt{a}$

C) $\sqrt[3]{ab}$

D) $\sqrt[6]{a}$

E) $\sqrt[6]{ab}$

16. $\sqrt{2\sqrt[3]{2\sqrt{2}}} = ?$

A) $\sqrt[12]{2^8}$

B) $\sqrt[6]{2^5}$

C) $\sqrt[12]{2^5}$

D) $\sqrt[4]{2^3}$

E) $\sqrt[6]{2^8}$

17. $\sqrt[4]{\frac{x^3}{\sqrt[3]{x^2}}} \cdot x^{\frac{7}{12}} = ?$

A) 0

B) 1

C) 2

D) 3

E) x^4

18. $\frac{\sqrt[3]{5} \cdot \sqrt{2}}{\sqrt[6]{10}} = ?$

A) $\sqrt[6]{10}$

B) $\sqrt[6]{15}$

C) $\sqrt[6]{20}$

D) $\sqrt[6]{25}$

E) $\sqrt[6]{200}$

19. $\sqrt[5]{2} \cdot \sqrt[3]{2} \cdot \sqrt{2} = ?$

A) $2^3\sqrt{5}$

B) $2^{30}\sqrt{2}$

C) $2^{15}\sqrt{3}$

D) $2^{30}\sqrt{7}$

E) $2^{30}\sqrt{3}$

20. $\sqrt[4]{2\sqrt[3]{2\sqrt{2}}} = ?$

A) $\sqrt[16]{8}$

B) $\sqrt[4]{4}$

C) $\sqrt[8]{8}$

D) $\sqrt[24]{8}$

E) $\sqrt[12]{6}$

21. $\frac{\sqrt{300} - 2\sqrt{27}}{\sqrt{75} + \sqrt{3}} = ?$

A) 1

B) $\frac{1}{2}$

C) $\frac{2}{3}$

D) $2\sqrt{3}$

E) $3\sqrt{3}$

Yanıtlar / Answers

1. E	2. B	3. C	4. B	5. C	6. A
7. D	8. E	9. E	10. A	11. A	12. D
13. E	14. C	15. D	16. D	17. B	18. C
19. B	20. C	21. C			

1. $\sqrt{\sqrt{0,0036} + \sqrt{0,09}} \cdot \frac{10}{\sqrt{2}} = ?$

- A) 3 B) $5\sqrt{2}$ C) $\sqrt{3}$
D) $3\sqrt{2}$ E) 5

2. $\frac{\sqrt[6]{(64)^{-1}}}{\sqrt[3]{4} \cdot \sqrt[4]{4}} \cdot \sqrt[6]{2} = ?$

- A) $\frac{1}{2}$ B) 2 C) 8 D) $\frac{1}{4}$ E) $\sqrt[6]{2}$

3. $\frac{\sqrt{32} - \sqrt{45} + \sqrt{2} - \sqrt{20}}{\sqrt{5} - \sqrt{2}} = ?$

- A) -5 B) $\sqrt{5} + \sqrt{2}$ C) 4 D) $\sqrt{2}$ E) $3\sqrt{5}$

4. $\frac{a}{\sqrt[n]{a^{n-r}}} = ?$

- A) $\sqrt[n]{a}$ B) $\sqrt[n]{a^r}$ C) $\sqrt[n]{a^{n+r}}$
D) $\sqrt[r]{a}$ E) $\sqrt[n-r]{a}$

5. $\sqrt{48} - \sqrt{12} - \sqrt{\frac{4}{3}} - \sqrt{\frac{1}{3}} = ?$

- A) 0 B) 1 C) $\sqrt{3}$
D) $\frac{1}{3}\sqrt{3}$ E) $\frac{2}{3}\sqrt{3}$

6. $10\sqrt{1,21} - 35\sqrt[3]{0,008} - 10\sqrt[4]{\frac{0,0016}{(0,25)^2}} = ?$

- A) 0 B) $\frac{1}{2}$ C) $\frac{2}{3}$ D) 5 E) 11

7. $2 - [3 : (\sqrt{3:2})^2 - 2 : (\sqrt{2:3})^2] - 3 = ?$

- A) -3 B) -2 C) 0 D) $\frac{2}{3}$ E) $\frac{3}{2}$

8. $\left(\sqrt[9]{\sqrt[3]{27x^6}}\right)^9 - \left(\sqrt[6]{\sqrt[4]{x^8}}\right)^6 = ?$

- A) x B) $2\sqrt{x}$ C) $3\sqrt{x}$ D) $x\sqrt{x}$ E) $2x^2$

9. $\sqrt{18} - \sqrt[3]{16} - 3\sqrt{2} + \sqrt[3]{54} = a\sqrt[3]{2} \Rightarrow a = ?$

- A) -1 B) 0 C) 1 D) $\sqrt[3]{2}$ E) $\sqrt{2}$

10. $\frac{5\sqrt{\frac{1}{2}} - \sqrt{0,5} + \sqrt{200}}{\sqrt{8}} = ?$

- A) 12 B) $6\sqrt{2}$ C) 6 D) 4 E) $2\sqrt{2}$

11. $4\sqrt{45} - 2\sqrt{80} - 4\sqrt{25} = ?$

- A) $3\sqrt{5}$ B) $2\sqrt{5}$ C) $\sqrt{5}$ D) 0 E) $9\sqrt{5}$

12. $\sqrt{45} - 10\sqrt{\frac{1}{5}} + \sqrt{80} - 4\sqrt{25} = ?$

- A) $3\sqrt{5}$ B) $7\sqrt{5}$ C) $4\sqrt{5}$ D) $5\sqrt{5}$ E) $2\sqrt{5}$

13. $3\sqrt{\frac{4}{3}} - 2\sqrt{\frac{25}{3}} + \sqrt{\frac{49}{3}} = ?$

- A) $\sqrt{3}$ B) $2\sqrt{3}$ C) $3\sqrt{3}$ D) $\frac{\sqrt{3}}{3}$ E) $5\sqrt{3}$

14. $\frac{\sqrt{5,76} + \sqrt{2,89} + \sqrt{1,96}}{\sqrt{0,49} + \sqrt{0,16}} = ?$

- A) $\frac{1}{2}$ B) 2 C) 3 D) 4 E) 5

15. $\sqrt{8,1} + \sqrt{4,9} - \sqrt{12,1} = ?$

- A) $\sqrt{10}$ B) $2\sqrt{10}$ C) $\frac{\sqrt{10}}{2}$
D) $\frac{\sqrt{10}}{5}$ E) 5

16. $\sqrt{\frac{4}{25} - \frac{3}{5} + \frac{9}{16}} = ?$

- A) -1 B) 2 C) $\frac{1}{3}$ D) $\frac{7}{20}$ E) $\frac{1}{4}$

17. $\frac{7}{\sqrt{7} - \frac{3}{\sqrt{7} - \frac{3}{\sqrt{7}}}} = ?$

- A) 1 B) $\frac{1}{4}$ C) $4\sqrt{7}$ D) 4 E) $2\sqrt{7}$

18. $3\sqrt{0,64} + 8\sqrt{0,49} = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

19. $3\sqrt{\frac{6}{7^{1-3x}} + \frac{7^{3x}}{7}} = ?$

- A) 7^{2x} B) 7^{3x} C) 7^x D) 7 E) 49

20. $\frac{\sqrt{252}}{\sqrt{7}} + \frac{\sqrt{27}}{\sqrt{\frac{1}{3}}} = ?$

- A) 1 B) 3 C) 6 D) 9 E) 15

Yanıtlar / Answers

1. D	2. D	3. A	4. B	5. C	6. A
7. C	8. E	9. D	10. C	11. A	12. C
13. A	14. E	15. C	16. D	17. C	18. E
19. C	20. E				

1. $(4\sqrt{5} - 2\sqrt{3})^2 - (4\sqrt{5} + 2\sqrt{3})^2 = ?$

- A) $32\sqrt{15}$ B) $16\sqrt{15}$ C) $-20\sqrt{5}$
 D) $-24\sqrt{15}$ E) $-32\sqrt{15}$

2. $\sqrt{6 - \sqrt{6 - \sqrt{6 - \sqrt{6 \dots}}}} = ?$

- A) 1 B) 2 C) 3 D) 6 E) 36

3. $\sqrt[3]{3\sqrt{3}\sqrt[3]{3 \dots}} = a \Rightarrow a^2 = ?$

- A) 3 B) 6 C) 9 D) 12 E) 36

4. $\left. \begin{array}{l} \sqrt[3]{49 : \sqrt[3]{49 : \sqrt[3]{49 \dots}}} = x \\ \sqrt{4\sqrt{4}\sqrt{4 \dots}} = y \end{array} \right\} \Rightarrow x^2 - y = ?$

- A) 3 B) 4 C) 7 D) 45 E) 53

5. $\sqrt{6 + \sqrt{6 + \sqrt{6 \dots}}} = ?$

- A) -2 B) -3 C) 0 D) 2 E) 3

6. $\sqrt{7 - 2\sqrt{12}} + \sqrt{8 + 2\sqrt{15}} = ?$

- A) $2 + \sqrt{5}$ B) $2 - \sqrt{5}$ C) $\sqrt{5} + 1$
 D) $2\sqrt{3}$ E) $\sqrt{3}$

7. $\sqrt{5 + 2\sqrt{6}} + \sqrt{8 - 2\sqrt{15}} - \sqrt{9 - 4\sqrt{5}} = ?$

- A) $3 + \sqrt{3}$ B) $5\sqrt{2}$ C) $2 + \sqrt{2}$
 D) $4 + \sqrt{5}$ E) $\sqrt{3}$

8. $\frac{4}{\sqrt{10 + 2\sqrt{21}}} + \sqrt{3} = ?$

- A) $4\sqrt{3}$ B) $5\sqrt{2}$ C) $6\sqrt{7}$
 D) $\sqrt{7}$ E) $2\sqrt{3}$

9. $\sqrt{5 + 2\sqrt{4}} \cdot \sqrt{5 - 2\sqrt{4}} = ?$

- A) 2 B) 3 C) 4 D) 9 E) 16

10. $\frac{1}{\sqrt{6 - 2\sqrt{8}}} - \frac{1}{\sqrt{6 + 2\sqrt{8}}} = ?$

- A) $\sqrt{2}$ B) $\sqrt{3}$ C) $2\sqrt{3}$
 D) $2\sqrt{2}$ E) $3\sqrt{2}$

$$11. \sqrt{\frac{\sqrt{3}+1}{\sqrt{3}-1}} - \sqrt{\frac{\sqrt{3}-1}{\sqrt{3}+1}} = ?$$

- A) $2\sqrt{3}$ B) $-\sqrt{3}$ C) $-2\sqrt{3}$
D) $\sqrt{2}$ E) 3

$$12. \frac{\sqrt{3}+\sqrt{5}}{\sqrt{3}-\sqrt{5}} - \frac{\sqrt{3}-\sqrt{5}}{\sqrt{3}+\sqrt{5}} = ?$$

- A) $-\sqrt{15}$ B) $-2\sqrt{15}$ C) $-3\sqrt{15}$
D) $-4\sqrt{15}$ E) $\sqrt{15}$

$$13. \sqrt{3} + \frac{2}{\sqrt{3}-2} - \frac{1}{\sqrt{3}+2} = ?$$

- A) -8 B) -6 C) -3 D) 0 E) 1

$$14. a = \frac{\sqrt{3}+2}{2}, b = \frac{2-\sqrt{3}}{2} \Rightarrow \frac{a}{b} + \frac{b}{a} + 3 = ?$$

- A) 12 B) 15 C) 17 D) 19 E) 21

$$15. \sqrt{72 - \sqrt{72 - \sqrt{72} \dots}} = ?$$

- A) 6 B) 8 C) 10 D) 12 E) 15

$$16. a = \sqrt[4]{4-\sqrt{2}}, b = \sqrt[4]{4+\sqrt{2}} \Rightarrow \left(\frac{a+b}{a-b}\right) = ?$$

- A) 0 B) -1 C) 1 D) 2 E) $\sqrt{2}$

$$17. (3\sqrt{7}-2\sqrt{7})^2 + (3\sqrt{7}+2\sqrt{7})^2 = ?$$

- A) 163 B) 175 C) 182 D) 190 E) 224

$$18. \sqrt{6-\sqrt{11}} + \sqrt{6+\sqrt{11}} = ?$$

- A) $\sqrt{6}$ B) $\sqrt{11}$ C) $\sqrt{12}$ D) $\sqrt{22}$ E) $\sqrt{33}$

$$19. (3\sqrt{2}-2)^2 - (3\sqrt{2}+2)^2 = ?$$

- A) $-24\sqrt{2}$ B) $-12\sqrt{2}$ C) $-6\sqrt{2}$
D) $-3\sqrt{7}$ E) $\sqrt{2}+2$

$$20. x < y < 0 \Rightarrow$$

$$\sqrt{x^2-2xy+y^2} + \sqrt{x^2} - \sqrt{y^2} = ?$$

- A) $2(x-y)$ B) $2(y-x)$ C) $y-x$
D) $2x$ E) $x-y$

Yanıtlar / Answers

1. E	2. B	3. C	4. D	5. E	6. A
7. C	8. D	9. B	10. A	11. D	12. B
13. B	14. C	15. B	16. B	17. C	18. D
19. A	20. B				

1. $\frac{\sqrt{6} + \sqrt{2}}{\sqrt{6} - \sqrt{3} + \sqrt{2} - 1} - \frac{2}{\sqrt{2}} = ?$

- A) 2 B) $\sqrt{2}$ C) $1 + \sqrt{2}$ D) $2 + \sqrt{2}$ E) 4

$$\frac{\sqrt{6} + \sqrt{2}}{\sqrt{6} - \sqrt{3} + \sqrt{2} - 1} - \frac{2}{\sqrt{2}}$$

2. $\sqrt{(1 + \sqrt{5})^2} \cdot \sqrt{6 - 2\sqrt{5}} = ?$

- A) $-\sqrt{5}$ B) -1 C) 1 **D) 4** E) 9

$$((5 - \sqrt{5})(1 + \sqrt{5}))$$

$$\sqrt{5} - 1 + 5 - \sqrt{5}$$

3. $x, y \in \mathbb{R}^+$

$$\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 3x + 3y \Rightarrow x \cdot y = ?$$

- A) $\frac{1}{9}$ B) $\frac{1}{3}$ C) 1 D) 3 E) 9

$$\frac{\sqrt{x}}{\sqrt{y}} + \frac{\sqrt{y}}{\sqrt{x}} = 3x + 3y$$

$$\frac{x + y}{\sqrt{x} \sqrt{y}} = 3(x + y)$$

4. $\sqrt[3]{24 + \sqrt{x}} + \sqrt[3]{8} = 3 \Rightarrow x = ?$

- A) 21 B) 25 C) 27 D) 34 E) 40

5. $\frac{\sqrt[3]{4^{x+1}}}{\sqrt[3]{8^{x-1}}} = 16 \Rightarrow x = ?$

- A) $-\frac{13}{5}$ B) $-\frac{11}{5}$ C) $-\frac{9}{5}$ D) $\frac{11}{5}$ E) $\frac{13}{5}$

6. $\sqrt[4]{0,16} = a \Rightarrow a^{x+1} = ?$

- A) $\frac{1}{6}$ B) 3 C) $\frac{5a}{3}$ D) $\frac{a}{3}$ E) $\frac{a}{6}$

7. $\frac{1}{\sqrt{2}} + \frac{\sqrt{5 + 2\sqrt{3} + \sqrt{9}}}{\sqrt{6} + 2} = ?$

- A) $3\sqrt{2}$ B) 3 C) $2\sqrt{2}$ D) 2 E) $\sqrt{2}$

8. $x = \frac{1}{\sqrt{3} + \sqrt{2}} \Rightarrow 5 - 2\sqrt{6} = ?$

- A) $10x$ B) $10x^2$ C) x^2 D) $2x^2$ E) $3x^2$

$$\frac{1}{\sqrt{3} + \sqrt{2}}$$

9. $\left. \begin{array}{l} a = 1 - \sqrt{3} \\ b = \sqrt{2} - 1 \end{array} \right\} \Rightarrow \sqrt{a^2} - \sqrt{(b-a)^2} + \sqrt[3]{-a^3} = ?$

- A) -2 B) -1 C) $\sqrt{3} - \sqrt{2}$
D) $2 - \sqrt{3}$ E) $\sqrt{2} + \sqrt{3}$

10. $\frac{\sqrt{1,44}}{0,6} + \frac{\sqrt{2,56}}{0,2} - \frac{\sqrt{0,64}}{0,4} = ?$

- A) 2 B) 4 C) 6 D) 8 E) 10

11. $\sqrt[3]{a\sqrt{b}} = \sqrt[6]{432} \Rightarrow a + b = ?$

- A) 5 B) 7 C) 9 D) 12 E) 15

12. $\left. \begin{array}{l} \sqrt{2} \approx 1,41 \\ \sqrt{3} \approx 1,73 \end{array} \right\} \Rightarrow \sqrt{18} + \sqrt{27} = ?$

- A) 9,42 B) 9,48 C) 10,12
D) 10,32 E) 10,56

13. $\sqrt{2\sqrt{\frac{1}{\sqrt{x}}}} = 2 \Rightarrow x = ?$

- A) 2^{-6} B) 2^{-5} C) 2^{-4}
D) 2^4 E) 2^5

14. $\frac{\sqrt[8]{16} \cdot \sqrt[4]{0,25}}{\sqrt{0,1}} = ?$

- A) 10 B) $2\sqrt{5}$ C) $\sqrt{6}$ D) $\sqrt{10}$ E) $4\sqrt{5}$

15. $\sqrt{\frac{9^{a+1} - 3^{2a}}{8 \cdot 3^a}} = ?$

- A) 1 B) 2 C) 3 D) 3^a E) 3^{-a}

16. $\sqrt[8]{2\sqrt{2}} = a \Rightarrow \sqrt[3]{a^{16}} = ?$

- A) 1 B) 2 C) 4 D) 8 E) 16

17. $\frac{1}{\sqrt{0,08}} + \frac{2}{\sqrt{0,32}} = ?$

- A) 1 B) $\sqrt{2}$ C) 10 D) $5\sqrt{2}$ E) $2\sqrt{3}$

18. $\sqrt[3]{3\sqrt{x}} = \sqrt[3]{2\sqrt{3}} \Rightarrow x = ?$

- A) 3 B) 6 C) 27 D) $\frac{4}{9}$ E) $\frac{3}{2}$

19. $\frac{\sqrt{6x} - \sqrt{3x}}{\sqrt{2} - 2} = -\sqrt{6} \Rightarrow x = ?$

- A) $\sqrt{2}$ B) $\sqrt{5}$ C) 4 D) 2 E) $\sqrt{22}$

20. $(\sqrt{3} + \sqrt{2})^{100} \cdot (5 - \sqrt{24})^{50} = ?$

- A) -1 B) 1 C) 3^{40}
D) 2^{100} E) $(\sqrt{3} + \sqrt{2})^{50}$

Yanıtlar / Answers					
1. A	2. D	3. E	4. B	5. B	6. E
7. E	8. C	9. C	10. D	11. E	12. A
13. C	14. D	15. C	16. B	17. D	18. D
19. C	20. B				

BİRİNCİ DERECEDEN DENKLEMLER FIRST ORDER EQUATIONS

BÖLÜM 7 CHAPTER 7

Tanım : $a \neq 0$ olmak üzere $ax + b = 0$ ifadesine birinci dereceden bir bilinmeyenli denklem denir.

Definition : Providing that $a \neq 0$, the expression $ax + b = 0$ is called a first order equation with one unknown.

 **$ax + b = 0$ Denkleminin Çözüm Kümesi**
The Solution Set of $ax + b = 0$

1. durum / Situation 1:

$$a \neq 0 \Rightarrow x = -\frac{b}{a} \Rightarrow \text{ÇK(SS)} = \{-\frac{b}{a}\}$$

2. durum / Situation 2:

$$a = 0 \text{ ve (and) } b \neq 0 \Rightarrow \text{ÇK(SS)} = \emptyset$$

3. durum / Situation 3:

$$a = 0 \text{ ve (and) } b = 0 \Rightarrow \text{ÇK(SS)} = \mathbb{R}$$

Örnek / Example:

$$\frac{x}{2} - 1 = \frac{x}{4} - 2 \Rightarrow \text{ÇK (SS)} = ?$$

- A) $\{-4\}$ B) $\{-3\}$ C) $\{-2\}$ D) $\{-1\}$ E) $\{0\}$

Çözüm / Solution:

$$\frac{x}{2} - 1 = \frac{x}{4} - 2$$

$$\frac{x}{2} - \frac{x}{4} = 1 - 2$$

(2)

$$\frac{2x}{4} - \frac{x}{4} = -1$$

$$\frac{x}{4} = -1$$

$$x = -4 \Rightarrow \text{Ç} = \{-4\}$$

Yanıt / Answer A

Örnek / Example:

$$\frac{3}{x+1} - \frac{4}{x-1} = 0 \Rightarrow \text{ÇK (SS)} = ?$$

- A) $\{-16\}$ B) $\{-14\}$ C) $\{-8\}$ D) $\{4\}$ E) $\{12\}$

Çözüm / Solution:

$$\frac{3}{\frac{x}{2}+1} - \frac{4}{\frac{x}{2}-1} = 0$$

$$\frac{3}{\frac{x}{2}+1} = \frac{4}{\frac{x}{2}-1}$$

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

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

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

$$\frac{-x}{2} = 7$$

$$-x = 14$$

$$x = -14 \Rightarrow \text{ÇK(SS)} = \{-14\}$$

Yanıt / Answer B

Örnek / Example:

$$\frac{x}{\frac{1}{2}+1} + 1 = \frac{3x+1}{3} \Rightarrow \text{ÇK (SS)} = ?$$

- A) $\{-2\}$ B) $\{-1\}$ C) $\{0\}$ D) $\{1\}$ E) $\{2\}$

Çözüm / Solution:

$$\frac{x}{\frac{1}{2}+1} + 1 = \frac{3x+1}{3}$$

$$\frac{x}{\frac{3}{2}} + 1 = \frac{3x}{3} + \frac{1}{3}$$

$$\frac{2x}{3} - \frac{3x}{3} = -1 + \frac{1}{3}$$

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

$$x = 2 \Rightarrow \text{ÇK(SS)} = \{2\}$$

Yanıt / Answer E



Birinci Dereceden İki Bilinmeyenli Denklemler First Order Equations with two Unknowns

Tanım : $a, b, c \in \mathbb{R}$, $a \neq 0$, $b \neq 0$ olmak üzere
 $ax + by + c = 0$ şeklindeki eşitliklere birinci dereceden iki bilinmeyenli denklem denir.

$$ax + by + c = 0$$

$$dx + ey + f = 0$$

şeklinde iki bilinmeyenli birden fazla denklemden oluşan sisteme iki bilinmeyenli denklem sistemi denir.

Definition : Provided that $a, b, c \in \mathbb{R}$, $a \neq 0$, $b \neq 0$, the equalities in the form of $ax + by + c = 0$ are called first order equations two unknowns.

$$ax + by + c = 0$$

$$dx + ey + f = 0$$

System in a form as shown above which is composed of more than one equalities with two unknowns is called a system of equation with two unknowns.

Örnek / Example:

$$\begin{cases} 2x + y = -1 \\ 5x - 6y = -28 \end{cases} \Rightarrow \text{ÇK (SS)} = ?$$

- A) $\{(-2, 3)\}$ B) $\{(-1, 4)\}$ C) $\{(2, 3)\}$
D) $\{(-2, 4)\}$ E) $\{(1, -3)\}$

Çözüm / Solution:

$$2x + y = -1$$

$$y = -1 - 2x$$

$$5x - 6(-1 - 2x) = -28$$

$$5x + 6 + 12x = -28$$

$$17x = -34$$

$$x = -2$$

$$2 \cdot (-2) + y = -1$$

$$y = 3$$

$$\text{ÇK (SS)} = \{(-2, 3)\}$$

Yanıt / Answer A

Örnek / Example:

$$\begin{cases} \frac{x+y-5}{5} = \frac{3}{2} \\ \frac{x-y+4}{4} = \frac{7}{5} \end{cases} \Rightarrow x = ?$$

- A) $\frac{125}{17}$ B) $\frac{123}{23}$ C) 7 D) $\frac{141}{20}$ E) 9

Çözüm / Solution:

$$\frac{x+y-5}{5} = \frac{3}{2} \Rightarrow 2x + 2y - 10 = 15 \Rightarrow 5/2x + 2y = 25$$

$$\frac{x-y+4}{4} = \frac{7}{5} \Rightarrow 5x - 5y + 20 = 28 \Rightarrow 2/5x - 5y = 8$$

$$\begin{array}{r} 10x + 10y = 125 \\ + 10x - 10y = 16 \\ \hline 20x = 141 \\ x = \frac{141}{20} \end{array}$$

Yanıt / Answer



İki Bilinmeyenli Denklem Sisteminin Çözüm Kümesi

The Solution Set of a System of Equation with two Unknowns

1. durum / Situation 1:

$\frac{a}{d} \neq \frac{b}{e}$ ise çözüm kümesi bir elemanlıdır.
then the solution set has one element.

Örnek / Example:

$$\begin{cases} 3x + 5y = 29 \\ 2x - 3y = -6 \end{cases} \Rightarrow \text{ÇK (SS)} = ?$$

- A) $\{(1, 2)\}$ B) $\{(2, 3)\}$ C) $\{(3, 4)\}$
D) $\{(2, 4)\}$ E) $\{(1, 3)\}$

Çözüm / Solution:

$$3/3x + 5y = 29$$

$$5/2x - 3y = -6$$

$$9x + 15y = 87$$

$$+ 10x - 15y = -30$$

$$19x = 57$$

$$x = 3$$

$$\Rightarrow 2 \cdot 3 - 3y = -6$$

$$-3y = -12$$

$$y = 4$$

$$\text{ÇK (SS)} = \{(3, 4)\}$$

Yanıt / Answer C

2. durum / Situation 2:

$\frac{a}{d} = \frac{b}{e} = \frac{c}{f}$ ise çözüm kümesi sonsuz elemanlıdır.
then the solution set has infinite number of elements.

Örnek / Example:

$$\begin{cases} 6x - 3y = -6 \\ 4x - 2y = -4 \end{cases} \Rightarrow \text{ÇK(SS)} = ?$$

- A) $\{(-2, 2)\}$ B) $\{(-3, 3)\}$ C) $\{(1, 5)\}$
D) R E) $\emptyset$

Çözüm / Solution:

$$\frac{6}{4} = \frac{-3}{-2} = \frac{-6}{-4} \Rightarrow$$

Çözüm kümesi sonsuz elemanlıdır.
Solution set has infinite number of elements.

Yanıt / Answer D

3. durum / Situation 3:

$\frac{a}{d} = \frac{b}{e} \neq \frac{c}{f}$ ise çözüm kümesi boş kümedir.
then the solution set is an empty set.

Örnek / Example:

$$\begin{cases} 2x - 3y = 6 \\ -x + \frac{3}{2}y = -12 \end{cases} \Rightarrow \text{ÇK(SS)} = ?$$

- A) $\{(1, 2)\}$ B) $\{(-1, 2)\}$ C) $\{(2, 5)\}$
D) R E) $\emptyset$

Çözüm / Solution:

$$\frac{2}{-1} = \frac{-3}{\frac{3}{2}} \neq \frac{6}{-12} \Rightarrow \text{ÇK(SS)} = \emptyset$$

Yanıt / Answer E

ÇÖZÜMLÜ TEST / TEST WITH SOLUTIONS

1. $x - (2 - x) \cdot (4 + x) = -(2 - x) \cdot (2 + x) \Rightarrow x = ?$

- A) -4 B) -3 C) $\frac{1}{4}$ D) $\frac{4}{3}$ E) 2

Çözüm / Solution:

$$\begin{aligned} x - (2 - x) \cdot (4 + x) &= -(2 - x) \cdot (2 + x) \\ x - (8 + 2x - 4x - x^2) &= -(4 + 2x - 2x - x^2) \end{aligned}$$

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

$$3x - 8 = -4$$

$$3x = 4$$

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

Yanıt / Answer D

2. $3 \cdot (x - 1) = (x - 3) + 2x \Rightarrow \text{ÇK(SS)} = ?$

- A) $\emptyset$ B) $\{0\}$ C) $\{1\}$ D) $\{2\}$ E) R

Çözüm / Solution:

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

$$3x - 3 = x - 3 + 2x$$

$$3x - 3 = 3x - 3$$

$$0 = 0$$

$$\Rightarrow \text{ÇK(SS)} = R$$

Yanıt / Answer E

3. $3ax - b = bx - 3a \Rightarrow x = ?$

- A) -a B) -1 C) 1 D) $\frac{3}{2}$ E) a

Çözüm / Solution:

$$3ax - b = bx - 3a$$

$$3ax - bx = b - 3a \Rightarrow x = \frac{(3a - b)}{3a - b}$$

$$= \frac{b - 3a}{3a - b}$$

$$= \frac{-(3a - b)}{3a - b}$$

$$= -1$$

Yanıt / Answer B

4. $2x - 6 - x = 6x + 8 - 24 \Rightarrow x = ?$

- A) 0 B) 2 C) 4 D) 6 E) 8

Çözüm / Solution:

$$2x - 6 - x = 6x + 8 - 24$$

$$x - 6 = 6x - 16$$

$$x - 6x = 6 - 16$$

$$-5x = -10$$

$$x = 2$$

Yanıt / Answer B

5. $\frac{2x}{3} + 4 = \frac{3x}{4} + 3 \Rightarrow x = ?$

- A) 12 B) 16 C) 18 D) 20 E) 40

Çözüm / Solution:

$$\frac{2x}{3} + 4 = \frac{3x}{4} + 3$$

$$\frac{2x}{3} - \frac{3x}{4} = 3 - 4$$

$$(4) \quad (3)$$

$$\frac{8x}{12} - \frac{9x}{12} = -1$$

$$\frac{-x}{12} = -1$$

$$x = 12$$

Yanıt / Answer A

6. $6 \cdot (x - 2) - 8 \cdot (x - 3) = 2 \cdot (4 + x) \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

Çözüm / Solution:

$$6 \cdot (x - 2) - 8 \cdot (x - 3) = 2 \cdot (4 + x)$$

$$6x - 12 - 8x + 24 = 8 + 2x$$

$$-2x + 12 = 8 + 2x$$

$$-2x - 2x = 8 - 12$$

$$-4x = -4$$

$$x = 1$$

Yanıt / Answer A

7. $(3x - 2)^2 - (x - 2)^2 = 0 \Rightarrow S S = ?$

- A) {0,1} B) {0} C) {1} D) {0,2} E) {1,2}

Çözüm / Solution:

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

$$9x^2 - 12x + 4 - (x^2 - 4x + 4) = 0$$

$$9x^2 - 12x + 4 - x^2 + 4x - 4 = 0$$

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

$$8x \cdot (x - 1) = 0$$

$$8x = 0 \text{ veya (or) } x - 1 = 0$$

$$x = 0 \text{ veya (or) } x = 1$$

Yanıt / Answer B

8. $\frac{x+1}{2} + \frac{x-2}{4} = \frac{x}{4} - 1 \Rightarrow x = ?$

- A) -4 B) -3 C) -2 D) 2 E) 3

Çözüm / Solution:

$$\frac{x+1}{2} + \frac{x-2}{4} = \frac{x}{4} - 1$$

$$(2) \quad (1) \quad (1) \quad (4)$$

$$\frac{2x + 2 + x - 2}{4} = \frac{x - 4}{4}$$

$$3x = x - 4$$

$$2x = -4$$

$$x = -2$$

Yanıt / Answer C

9. $\frac{a - \frac{1}{a}}{2 + \frac{2}{a}} = \frac{3a - 4}{4} \Rightarrow a = ?$

- A) -4 B) -2 C) 1 D) 2 E) 4

Çözüm / Solution:

$$\frac{a-\frac{1}{a}}{2+\frac{2}{a}} = \frac{3a-4}{4} \Rightarrow \frac{\frac{a^2-1}{a}}{\frac{2a+2}{a}} = \frac{3a-4}{4}$$

$$\frac{a^2-1}{2a+2} = \frac{3a-4}{4}$$

$$\frac{(a-1)(a+1)}{2(a+1)} = \frac{3a-4}{4}$$

$$\frac{a-1}{2} = \frac{3a-4}{4}$$

$$4a-4 = 6a-8$$

$$4a-6a = -8+4$$

$$-2a = -4$$

$$a = 2$$

Yanıt / Answer D

$$10. \frac{a+2}{a-1} - \frac{2-a}{1-a} = 1 \Rightarrow a = ?$$

- A) 0 B) 1 C) 2 D) 3 E) 5

Çözüm / Solution:

$$\frac{a+2}{a-1} - \frac{2-a}{1-a} = 1$$

$$\frac{a+2}{a-1} + \frac{2-a}{a-1} = 1$$

$$\frac{a+2+2-a}{a-1} = 1$$

$$\frac{4}{a-1} = 1$$

$$a-1=4$$

$$a=5$$

Yanıt / Answer E

$$11. \frac{3x+2}{4} - \frac{4x-3}{4} = 2 \Rightarrow x = ?$$

- A) -3 B) $\frac{1}{3}$ C) $\frac{1}{2}$ D) 1 E) 3

Çözüm / Solution:

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

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

$$\frac{-x+5}{4} = \frac{2}{1}$$

$$-x+5=8$$

$$-x=3$$

$$x=-3$$

Yanıt / Answer A

$$12. (x+a) \cdot (x-a) = 2x^2 - (x-a)^2 \Rightarrow x = ? (a \neq 0)$$

- A) -a B) $-\frac{a}{3}$ C) 0 D) $\frac{a}{2}$ E) a

Çözüm / Solution:

$$(x+a) \cdot (x-a) = 2x^2 - (x-a)^2$$

$$x^2 - ax + ax - a^2 = 2x^2 - (x^2 - 2ax + a^2)$$

$$x^2 - a^2 = 2x^2 - x^2 + 2ax - a^2$$

$$x^2 = x^2 + 2ax$$

$$0 = 2ax$$

$$ax = 0$$

$$x = 0$$

Yanıt / Answer C

$$13. xy - z - \frac{xn}{z} + \frac{n}{y} = 0 \Rightarrow x = ?$$

- A) $\frac{z}{y}$ B) x C) z D) y^2 E) yx

Çözüm / Solution:

$$xy - \frac{xn}{z} = z - \frac{n}{y} \Rightarrow x \cdot \left(y - \frac{n}{z}\right) = z - \frac{n}{y}$$

$$x \cdot \frac{yz-n}{z} = \frac{zy-n}{y} \Rightarrow x \cdot \frac{(yz-n)}{z} = \frac{(zy-n)}{y}$$

$$\frac{x}{z} = \frac{1}{y} \Rightarrow x = \frac{z}{y}$$

Yanıt / Answer A

$$14. \left. \begin{array}{l} 5^b : 3^a = 30 \\ 3^a : 4 = \frac{1}{24} \end{array} \right\} \Rightarrow b = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

Çözüm / Solution:

$$\frac{3^a}{4} = \frac{1}{24} \Rightarrow 3^a = \frac{1}{6}$$

$$5^b : \frac{1}{6} = 30 \Rightarrow 5^b \cdot 6 = 30$$

$$5^b = 5 \Rightarrow b = 1$$

Yanıt / Answer A

$$15. y - 2[y - 2[y - 2 \cdot (y - 2)]] = 21 \Rightarrow y = ?$$

- A) -2 B) -1 C) 0 D) 1 E) 2

Çözüm / Solution:

$$y - 2[y - 2[y - 2 \cdot (y - 2)]] = 21$$

$$y - 2 \cdot [y - 2 \cdot [y - 2y + 4]] = 21$$

$$y - 2 \cdot [y - 2 \cdot [-y + 4]] = 21$$

$$y - 2 \cdot [y + 2y - 8] = 21$$

$$y - 2 \cdot [3y - 8] = 21$$

$$-5y = 21 - 16$$

$$-5y = 5 \Rightarrow y = -1$$

Yanıt / Answer B

$$16. \frac{a-2}{3} - 0,4 \cdot \frac{(a-1)}{3} = \frac{2}{3} \Rightarrow a = ?$$

- A) 6 B) 7 C) 8 D) 26 E) 32

Çözüm / Solution:

$$\frac{a-2}{3} - \frac{4}{10} \cdot \frac{a-1}{3} = \frac{2}{3}$$

$$\frac{5a-10-2(a-1)}{15} = \frac{2}{3}$$

$$\frac{5a-10-2a+2}{15} = \frac{2}{3}$$

$$\frac{3a-8}{15} = \frac{2}{3}$$

$$9a - 24 = 30$$

$$9a = 54 \Rightarrow a = 6$$

Yanıt / Answer A

$$17. \left. \begin{array}{l} a-b=2 \\ c-d=4 \\ a+c=10 \end{array} \right\} \Rightarrow a+b+c+d=?$$

- A) 10 B) 11 C) 12 D) 13 E) 14

Çözüm / Solution:

$$\left. \begin{array}{l} a-b=2 \\ c-d=4 \\ a+c=10 \end{array} \right\} \begin{array}{l} a+c=10 \\ -1/a-b=2 \\ a+c=10 \end{array} \quad \begin{array}{l} a+c=10 \\ -1/c-d=4 \\ a+c=10 \end{array}$$

$$\begin{array}{l} -a+b=-2 \\ b+c=8 \end{array} \quad \begin{array}{l} -c+d=-4 \\ a+d=6 \end{array}$$

$$a+b+c+d=6+8=14$$

Yanıt / Answer E

$$18. \left. \begin{array}{l} 2x=3y \\ \frac{x}{3}+2y=10 \end{array} \right\} \Rightarrow y = ?$$

- A) 1 B) 2 C) 4 D) 6 E) 8

Çözüm / Solution:

$$2x=3y$$

$$2x-3y=0$$

$$\frac{x}{3}+2y=10$$

$$\frac{x+6y}{3} = \frac{10}{1}$$

$$x+6y=30$$

$$2/2x-3y=0$$

$$-4/x+6y=30$$

$$4x-6y=0$$

$$5x=30$$

$$x=6 \Rightarrow 206=3y \Rightarrow y=4$$

Yanıt / Answer C

$$19. \frac{x-1}{2} + \frac{x+1}{4} = 2x - \frac{x-1}{4} \Rightarrow x = ?$$

- A) $-\frac{1}{2}$ B) $-\frac{1}{3}$ C) $\frac{1}{4}$ D) $\frac{1}{3}$ E) $\frac{1}{2}$

Çözüm / Solution:

$$\frac{x-1}{2} + \frac{x+1}{4} = \frac{2x}{1} - \frac{x-1}{4}$$

$$(2) \quad (1) \quad (4) \quad (1)$$

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

$$\frac{3x-1}{4} = \frac{7x+1}{4}$$

$$3x-7x = 1+1$$

$$-4x = 2$$

$$x = -\frac{2}{4}$$

$$x = -\frac{1}{2}$$

Yanıt / Answer A

$$20. \begin{cases} 3x-5y+2z=-11 \\ 6x-2y+5z=7 \end{cases} \Rightarrow x+y+z=?$$

- A) 1 B) 2 C) 3 D) 4 E) 6

Çözüm / Solution:

$$-1/3x-5y+2z=-11$$

$$6x-2y+5z=7$$

$$-3x+5y-2z=11$$

$$+ \quad 6x-2y+5z=7$$

$$3x+3y+3z=18$$

$$3 \cdot (x+y+z) = 18$$

$$x+y+z=6$$

Yanıt / Answer E

$$21. \begin{cases} a+b=14 \\ b+c=12 \\ a+c=16 \end{cases} \Rightarrow 2a+b-c=?$$

- A) 12 B) 13 C) 14 D) 15 E) 16

Çözüm / Solution:

$$a+b=14$$

$$b+c=12$$

$$-1/ \quad a+c=16$$

$$2b=10$$

$$b=5 \Rightarrow a=9 \Rightarrow c=7$$

$$\Rightarrow 2 \cdot (9) + 5 - 7 = 16$$

Yanıt - Answer E

YÖS SORULARI / YÖS QUESTIONS

$$1. \begin{cases} 5-x=y \\ 2x-6y=2 \end{cases} \Rightarrow (x,y) = ?$$

- A) (-3, 8) B) (-3, 1) C) (4, 1)
D) (4, 8) E) (9, -4)

(YÖS 1982)

Çözüm / Solution:

$$5-x=y \Rightarrow$$

$$x+y=5$$

$$2x-6y=2 \Rightarrow$$

$$-1/x-3y=1$$

$$x+y=5$$

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

$$4y=4$$

$$y=1$$

$$x=4$$

$$(4,1)$$

Yanıt / Answer C

$$2. \frac{3}{b} = \frac{5}{d}, \frac{3}{4}d = \frac{5}{4}b + c - 1 \Rightarrow c = ?$$

- A) 0 B) 1 C) 2 D) 3 E) 4

(YÖS 1982)

Çözüm / Solution:

$$\frac{3}{b} = \frac{5}{d} \Rightarrow 3d=5b \Rightarrow 3d-5b=0$$

$$\frac{3}{4}d = \frac{5}{4}b + c - 1$$

$$\frac{3d}{4} - \frac{5b}{4} = c - 1$$

$$\frac{3d-5b}{4} = c - 1$$

$$\frac{0}{4} = c - 1$$

$$0 = c - 1$$

$$c = 1$$

Yanıt / Answer B

$$3. \begin{cases} 2x+y=z \\ x+y+z=12 \\ x+z=3y \end{cases} \Rightarrow z = ?$$

- A) 3 B) 4 C) 5 D) 6 E) 7

(YÖS 1987)

Çözüm / Solution:

$$\begin{aligned}x + z &= 3y \\x + z + y &= 12 \\3y + y &= 12 \\y &= 3\end{aligned}$$

$$\begin{aligned}2x + y &= z \Rightarrow 2x - z = -3 \\2x + 3 &= z \\x + z &= 9 \\3x &= 6 \\x &= 2, z = 7\end{aligned}$$

Yanıt / Answer E

$$\begin{aligned}4. \quad & \left. \begin{aligned}K + 2L + M &= 6 \\2K - L + 2M &= 7\end{aligned} \right\} \Rightarrow K + L + M = ? \\& \text{A) 1} \quad \text{B) 2} \quad \text{C) 3} \quad \text{D) 4} \quad \text{E) 5}\end{aligned}$$

(YÖS 1987)

Çözüm / Solution:

$$\begin{aligned}-2 / K + 2L + M &= 6 \Rightarrow -2K - 4L - 2M = -12 \\2K - L + 2M &= 7 \quad + \quad 2K - L + 2M = 7 \\& \quad \quad \quad -5L = -5 \\& \quad \quad \quad L = 1\end{aligned}$$

$$\begin{aligned}K + 2 \cdot 1 + M &= 6 \Rightarrow K + M = 4 \\K + L + M &= 5\end{aligned}$$

Yanıt / Answer E

$$\begin{aligned}5. \quad f(x) &= ax + b, f(1) = -2, f(2) = 1 \Rightarrow f(3) = ? \\& \text{A) 1} \quad \text{B) 2} \quad \text{C) 3} \quad \text{D) 4} \quad \text{E) 5}\end{aligned}$$

(YÖS 1987)

Çözüm / Solution:

$$\begin{aligned}f(x) &= ax + b \\f(1) &= a + b = -2 \Rightarrow -1 / a + b = -2 \\f(2) &= 2a + b = 1 \Rightarrow \\& \quad \quad \quad 2a + b = 1 \\& \quad \quad \quad -a - b = 2 \\& \quad \quad \quad 2a + b = 1 \\& \quad \quad \quad a = 3 \\& \quad \quad \quad b = -5\end{aligned}$$

$$\begin{aligned}f(3) &= 3 \cdot 3 - 5 \\f(3) &= 4\end{aligned}$$

Yanıt / Answer D

$$6. \quad x > 0, \quad \frac{1}{3} + \frac{1}{x} = \frac{x}{6} \Rightarrow x = ?$$

A) 1 B) 2 C) 3 D) 4 E) 6

(YÖS 1989)

Çözüm / Solution:

$$\frac{1}{3} + \frac{1}{x} = \frac{x}{6}$$

$$\frac{1}{3x} + \frac{1}{3x} = \frac{x}{6} \Rightarrow \frac{2}{3x} = \frac{x}{6}$$

$$3x^2 = 12 \Rightarrow x^2 = 4 \Rightarrow x = \pm 2, \quad x = 2$$

Yanıt / Answer B

$$7. \quad \frac{2}{x} - \frac{1}{2} = 6 \Rightarrow x = ?$$

A) 6 B) 5 C) 4 D) 3 E) 2

(YÖS 1990)

Çözüm / Solution:

$$\frac{2}{x} - \frac{1}{2} = 6$$

$$\frac{2x}{1} - \frac{x}{2} = 6 \Rightarrow \frac{3x}{2} = 6$$

$$\begin{aligned}(2) \quad (1) \\3x &= 12 \\x &= 4\end{aligned}$$

Yanıt / Answer C

$$8. \quad \frac{x}{2} - \frac{x-1}{4} = 1 \Rightarrow x = ?$$

A) 1 B) 2 C) 3 D) 4 E) 6

(YÖS 1990)

Çözüm / Solution:

$$\frac{x}{2} - \frac{x-1}{4} = 1$$

$$\begin{aligned}(2) \quad \frac{2x - x + 1}{4} = 1 \Rightarrow \frac{x+1}{4} = 1 \\x+1 &= 4 \\x &= 3\end{aligned}$$

Yanıt / Answer C

9. $0 < a, 0 < b, 0 < c, \frac{b}{a} = \frac{1}{3}, \frac{a}{c} = \frac{2}{3}$

$a + b + c = 34 \Rightarrow a = ?$

- A) 8 B) 10 C) 12 D) 14 E) 16

(YÖS 1990)

Çözüm / Solution:

$$\frac{b}{a} = \frac{1}{3} \Rightarrow b = \frac{a}{3}$$

$$\frac{a}{c} = \frac{2}{3} \Rightarrow c = \frac{3a}{2}$$

$$a + b + c = 34$$

$$\frac{a}{1} + \frac{a}{3} + \frac{3a}{2} = 34$$

$$(6) \quad (2) \quad (3)$$

$$\frac{6a}{6} + \frac{2a}{6} + \frac{9a}{6} = 34$$

$$\frac{17a}{6} = \frac{34}{1}$$

$$17 \cdot a = 34 \cdot 6 \Rightarrow a = 12$$

Yanıt / Answer C

10. $K > 0, x = 2K, y = 3K, z = 4K,$

$x + y + z = 360 \Rightarrow z = ?$

- A) 180 B) 160 C) 120 D) 80 E) 60

(YÖS 1995)

Çözüm / Solution:

$$x + y + z = 360$$

$$2K + 3K + 4K = 360$$

$$\frac{9K}{9} = \frac{360}{9}$$

$$K = 40, z = 4 \cdot K, z = 4 \cdot 40 = 160$$

Yanıt / Answer B

11. $\begin{cases} x - 0,2y = 0,2 \\ 2x - y = -20 \end{cases} \Rightarrow x + y = ?$

- A) 21 B) 29 C) 41 D) 48 E) 51

(YÖS 1995)

Çözüm / Solution:

$$-5/x - 0, 2y = 0,2$$

$$2x - y = -20$$

$$-5x + y = -1$$

$$2x - y = -20$$

$$-3x = -21$$

$$x = 7$$

$$y = 34, x + y = 7 + 34 = 41$$

Yanıt / Answer C

$$2a + b = 10$$

12. $a + 2c = 14 \Rightarrow ? < ? < ?$

$$b + c = 7$$

- A) $b < a < c$ B) $b < c < a$ C) $a < b < c$
D) $a < c < b$ E) $c < a < b$

(YÖS 1997)

Çözüm / Solution:

$$2a + b = 10$$

$$-b - c = -7$$

$$2a - c = 3$$

$$a + 2c = 14$$

$$4a - 2c = 6$$

$$5a = 20$$

$$a = 4, b = 2, c = 5, b < a < c$$

Yanıt / Answer A

13. $0,003 = \frac{1}{100} \cdot k \Rightarrow k = ?$

- A) $\frac{3}{10}$ B) $\frac{3}{100}$ C) $\frac{3}{20}$ D) $\frac{1}{30}$ E) 30

(YÖS 2000)

Çözüm / Solution:

$$k = 0,003 \cdot 100$$

$$k = 0,3 = \frac{3}{10}$$

Yanıt / Answer A

14. $(3x - 1)^2 = 9x^2 + 13 \Rightarrow x = ?$

- A) 3 B) 2 C) -3 D) -2 E) $-\frac{1}{2}$

(YÖS 2000)

Çözüm / Solution:

$$9x^2 - 6x + 1 = 9x^2 + 13$$

$$-6x + 1 = 13$$

$$-6x = 12 \Rightarrow x = -2$$

Yanıt / Answer D

15. $2^{x+4} + 2^{x+1} + 2^x = 304 \Rightarrow x = ?$

- A) 3 B) 4 C) 5 D) 6 E) 7

(YÖS 2002)

Çözüm / Solution:

$$2^{x+4} + 2^{x+1} + 2^x = 304$$

$$2^x \cdot 2^4 + 2^x \cdot 2 + 2^x = 304$$

$$2^x (16 + 2 + 1) = 304$$

$$2^x \cdot 19 = 304$$

$$2^x = 16$$

$$2^x = 2^4 \Rightarrow x = 4$$

Yanıt / Answer B

16. $5 - \frac{5}{x-5} = 10 \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 6

(YÖS 2004)

Çözüm / Solution:

$$5 - \frac{5}{x-5} = 10$$

$$\frac{5}{1} - \frac{5}{(x-5)} = 10$$

$$\frac{5x-25-5}{x-5} = 10$$

$$\frac{5x-30}{x-5} = 10$$

$$5x-30 = 10x-50$$

$$20 = 5x \Rightarrow x = 4$$

Yanıt / Answer D

17. $x, y \in \mathbb{Z}$

$$-3 < x < 6$$

$$-5 < y < 1$$

$$\max(x - y) = ?$$

- A) 11 B) 9 C) 5 D) -2 E) -8

(YÖS 2005)

Çözüm / Solution:

$$\max(x-y) = \max(x) - \min(y)$$

$$= 5 - (-4) = 9$$

Yanıt / Answer B

18. $\frac{1}{1 - \frac{1}{1 + \frac{1}{x}}} = \frac{1}{2}$

$$x = ?$$

- A) -2 B) $-\frac{1}{2}$ C) $\frac{1}{2}$ D) 1 E) 2

(YÖS 2005)

Çözüm / Solution:

$$\frac{1}{1 - \frac{1}{\frac{x+1}{x}}} = \frac{1}{1 - \frac{x}{x+1}} = \frac{1}{\frac{1}{x+1}}$$

$$x+1 = \frac{1}{2}$$

$$x = -\frac{1}{2}$$

Yanıt / Answer B

19. $\frac{1}{x} + \frac{2}{y} = \frac{11}{2}$

$$\frac{3}{x} + \frac{1}{y} = 24$$

$$\frac{1}{x} + \frac{1}{y} = ?$$

- A) 5 B) 6 C) 7 D) 8 E) 9

(YÖS 2006)

Çözüm / Solution:

$$\frac{1}{x} + \frac{2}{y} = \frac{11}{2}$$

$$\frac{3}{x} + \frac{1}{y} = 24$$

$$\left. \begin{array}{l} \frac{2}{x} + \frac{4}{y} = 11 \\ \frac{3}{x} + \frac{1}{y} = 24 \end{array} \right\} \Rightarrow \frac{5}{x} + \frac{5}{y} = 35$$

$$5 \left(\frac{1}{x} + \frac{1}{y} \right) = 35$$

$$\frac{1}{x} + \frac{1}{y} = 7$$

Yanıt / Answer C

$$1. \quad \frac{4}{3 - \frac{2}{1 + \frac{1}{x-1}}} = 2 \Rightarrow x = ?$$

Yanıt / Answer : 2

$$2. \quad \begin{cases} x+y=5 \\ x+z=17 \\ y+z=2 \end{cases} \Rightarrow \frac{x}{y} = ?$$

$$\begin{aligned} x+z &= 17 \\ x+y &= 5 \\ \hline y-z &= -12 \\ y+z &= 2 \\ \hline 2y &= -10 \\ y &= -5 \end{aligned}$$

Yanıt / Answer : -2

$$3. \quad \begin{cases} x+3y+3z=13 \\ 3x+y+z=7 \end{cases} \Rightarrow x+y+z = ?$$

Yanıt / Answer : 5

$$4. \quad \begin{cases} 2x^2 - 5xy + 3y^2 = -10 \\ 2x - 3y = 5 \end{cases} \Rightarrow x - y = ?$$

Yanıt / Answer : -2

$$5. \quad \frac{3}{2-x} - \frac{2}{x-2} = \frac{3-x}{2x-10} \Rightarrow \text{ÇK(SS)} = ?$$

Yanıt / Answer : {7, 8}

$$6. \quad 5x - 3(x-1) = -2(2x+4) - 7 \Rightarrow x = ?$$

Yanıt / Answer : -3

$$7. \quad 1 - \frac{1 - \frac{x}{2}}{2} = 1 \Rightarrow \text{ÇK(SS)} = ?$$

Yanıt / Answer : {-2, 2}

$$8. \quad \frac{1}{x-1} + \frac{1}{x-3} = \frac{3x-8}{(x-3)(x-1)} \Rightarrow x = ?$$

Yanıt / Answer : 4

$$9. \left. \begin{aligned} \frac{1}{x} + \frac{1}{y} &= \frac{1}{28} \\ \frac{1}{y} + \frac{1}{z} &= \frac{1}{2} \\ \frac{1}{x} + \frac{1}{z} &= \frac{1}{4} \end{aligned} \right\} \Rightarrow z = ?$$

Yanıt / Answer : $\frac{14}{5}$

$$10. \frac{x}{3} - \frac{x}{5} = 12 - \frac{x}{5} \Rightarrow x = ?$$

Yanıt / Answer : 36

$$11. 3x + 2(5 - 2x) + 9 = 12x - (3 - 5x) + 4x \Rightarrow x = ?$$

Yanıt / Answer : 1

$$12. x + \frac{3x-5}{2} = 8 - \frac{2x-16}{3} \Rightarrow x_1 = ?$$

Yanıt / Answer : 5

$$13. 0,37 \cdot x - 0,117 - 0,283 = 0,33x \Rightarrow x = ?$$

Yanıt / Answer : 10

$$14. x + \frac{1}{1 - \frac{1}{1 - \frac{1}{x}}} = 1 \Rightarrow \text{ÇK(SS)} = ?$$

Yanıt / Answer : $R - \{0, 1\}$

$$15. (4x + 10)^2 + (2y - 12)^2 = 0 \Rightarrow x + y = ?$$

Yanıt / Answer : $\frac{7}{2}$

$$16. \left. \begin{aligned} y - \frac{3y}{x} &= 4 \\ 1 + \frac{x}{y} &= 5 \end{aligned} \right\} \Rightarrow x = ?$$

Yanıt / Answer : 19

1. $\frac{x+1}{2} - \frac{x-3}{3} = \frac{11}{6} \Rightarrow x = ?$

- A) 5 B) 4 C) 3 D) 2 E) 1

2. $\frac{x}{x+3} - \frac{1}{1+\frac{2}{x+1}} = -\frac{1}{5} \Rightarrow x = ?$

- A) 2 B) 1 C) $\frac{1}{2}$ D) $\frac{3}{5}$ E) $\frac{1}{4}$

3. $x, y \in \mathbb{Z}^+$
 $x^2 - y^2 = 13$

$\Rightarrow \frac{x}{x+2} + \frac{1}{2 - \frac{1}{x-2}} = ?$

- A) $\frac{3}{2}$ B) $\frac{4}{3}$ C) 1 D) $\frac{1}{2}$ E) $\frac{1}{3}$

4. $x + \frac{2}{x} = 3 \Rightarrow x - \frac{2}{x} = ?$

- A) 3 B) 2 C) $\frac{2}{3}$ D) -2 E) -1

5. $\begin{cases} 3x - 4y - 5z = 13 \\ 4x - y + 4z = 24 \\ 2x - 10y - 6z = -13 \end{cases} \Rightarrow x + y + z = ?$

- A) 10 B) 12 C) 16 D) 18 E) 24

6. $|x - y + z - 6| + |x + y - z - 16| = 0 \Rightarrow x = ?$

- A) 8 B) 9 C) 10 D) 11 E) 12

7. $\begin{cases} 5a - 8b + 2c = 9 \\ a + 4b - c = 6 \end{cases} \Rightarrow a = ?$

- A) -5 B) -2 C) -1 D) 2 E) 3

8. $\begin{cases} x + y = 9 \\ x^2 - y^2 = 45 \\ 2x + 3m - 1 = -2 \end{cases} \Rightarrow m = ?$

- A) -5 B) -4 C) 0 D) 3 E) 5

9. $\frac{x+5}{x-4} = \frac{x+3}{x-2} \Rightarrow x = ?$

- A) 3 B) $\frac{2}{3}$ C) -1 D) $-\frac{1}{2}$ E) $-\frac{3}{4}$

10. $(2x - y - 6)^2 + (3x + 6y - 34)^2 = 0 \Rightarrow x + y = ?$

- A) 3 B) $\frac{17}{5}$ C) 4 D) $\frac{24}{5}$ E) 8

11. $a \neq b$

$$\frac{1}{a} - \frac{1}{b} = \frac{1}{a^2} - \frac{1}{b^2} = 8 \Rightarrow b = ?$$

- A) $\frac{7}{2}$ B) 2 C) $-\frac{2}{7}$ D) $-\frac{5}{2}$ E) $-\frac{7}{2}$

12. $\begin{cases} 2a - 3b = 42 \\ 3b + c = 18 \\ c - 3d = 6 \end{cases} \Rightarrow 2a - 6b - 2c + 3d = ?$

- A) 12 B) 14 C) 16 D) 18 E) 22

13. $\frac{1}{x-a+2} + \frac{1}{x+2} + \frac{1}{x-5} = \frac{13}{36}$

$x_1 = 7 \Rightarrow a = ?$

- A) -5 B) 0 C) 5 D) 9 E) 13

14. $\frac{2}{x} - \frac{x}{x+2} + \frac{x-2}{x} = \frac{6}{5} \Rightarrow \text{ÇK(SS)} = ?$

- A) {1} B) {0, 2} C) $\left\{\frac{1}{2}\right\}$
D) $\left\{-\frac{1}{3}\right\}$ E) $\left\{0, -\frac{1}{3}\right\}$

15. $\sqrt{x^2 - 8x + 16} + \sqrt{4y^2 + 24y + 36} = 0 \Rightarrow x - y = ?$

- A) -7 B) -3 C) -1 D) 6 E) 7

16. $x \in \mathbb{Z}$,

$0 \leq x < 7$,

$\max(x^3 - 4x^2) = ?$

- A) 108 B) 96 C) 84 D) 72 E) 64

17. $a, b, c \in \mathbb{Z}$

$a \cdot b = 24$

$a \cdot c = 42$

$b \cdot c = 28$

$\Rightarrow a + b + c = ?$

- A) 22 B) 24 C) 20 D) 18 E) 17

18. $x, y, z \in \mathbb{Z}^+$

$\frac{x \cdot z}{y} = 4$

$\frac{x \cdot y}{z} = 3$

$\frac{y \cdot z}{x} = 2$

$\Rightarrow x^4 - y^4 + z^2 = ?$

- A) 116 B) 144 C) 169 D) 225 E) 249

19. $\begin{cases} 3x + 2y + 5z = 18 \\ 4x + 3y + 6z = 28 \end{cases} \Rightarrow x + y + z = ?$

- A) 5 B) 10 C) 15 D) 20 E) 30

20. $\begin{cases} a + b + c = 8 \\ b + c + d = 7 \\ c + d + a = 11 \end{cases} \Rightarrow a + b + d = ?$

- A) $13 - c$ B) $26 - 3c$ C) $13 - \frac{3c}{2}$
D) $11 - \frac{3c}{2}$ E) $-3c$

Yanıtlar / Answers

1. D	2. A	3. B	4. E	5. A	6. D
7. E	8. A	9. D	10. E	11. C	12. D
13. E	14. D	15. E	16. D	17. E	18. A
19. B	20. C				

1. $\frac{a-1}{2-\frac{2}{a}} = \frac{2a-4}{4} \Rightarrow \text{ÇK(SS)} = ?$

- A) {4} B) {2} C) {-2} D) {-4} E) $\emptyset$

2. $\frac{a+2}{a-1} - \frac{2-a}{1-a} = 1 \Rightarrow a = ?$

- A) 5 B) 3 C) 2 D) 1 E) 0

3. $\frac{3x+2}{4} - \frac{4x-3}{4} = 2 \Rightarrow x = ?$

- A) -3 B) $\frac{1}{3}$ C) 3 D) 1 E) $\frac{1}{2}$

4. $(x+a)(x-a) = 2x^2 - (x-a)^2, a \neq 0 \Rightarrow x = ?$

- A) a B) -a C) 0 D) $\frac{a}{2}$ E) $-\frac{a}{3}$

5. $\frac{x-1}{2} + \frac{x+1}{4} = 2x - \frac{x-1}{4} \Rightarrow x = ?$

- A) $\frac{1}{3}$ B) $\frac{1}{2}$ C) $-\frac{1}{3}$
D) $-\frac{1}{2}$ E) $\frac{1}{4}$

6. $\frac{2}{2+\frac{2}{2+\frac{2}{x-1}}} = 2 \Rightarrow x = ?$

- A) 0 B) 1 C) $-\frac{1}{2}$ D) -2 E) $\frac{1}{2}$

7. $12-2a-6\sqrt{2} + \frac{a}{6} + 2a-12+5\sqrt{2} = 0 \Rightarrow a = ?$

- A) $6\sqrt{2}$ B) 2 C) 0 D) 12 E) 8

8. $0,2x+3 = x + \frac{1}{3} \Rightarrow x = ?$

- A) -2 B) 0 C) 2 D) $\frac{24}{7}$ E) $\frac{13}{3}$

9. $\frac{2x-1}{3} + \frac{x-1}{2} = x \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

10. $\frac{0,2x-0,1}{x-0,8} = 0,1 \Rightarrow x = ?$

- A) $-\frac{5}{3}$ B) $-\frac{3}{5}$ C) 0 D) $\frac{1}{5}$ E) $\frac{3}{5}$

11. $\frac{1}{a} + \frac{1}{x} = \frac{1}{b} \Rightarrow x = ?$

- A) 0 B) ab C) $\frac{1}{ab}$
D) $\frac{ab}{a-b}$ E) a + b

12. $(2-x)^2 = x(x-2) \Rightarrow x = ?$

- A) -2 B) 0 C) 2 D) 4 E) 5

13. $2^{x-1} \cdot 5^{x+1} = \left(\frac{1}{5}\right)^{-2} \Rightarrow x = ?$

- A) -3 B) -1 C) 0 D) 1 E) 2

14. $2^x + 3 \cdot 2^x + 2^{x+2} = 64 \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) $\frac{1}{2}$

15. $3^{x-2} + \sqrt{9^{x-2}} = \frac{2}{27} \Rightarrow x = ?$

- A) -2 B) -1 C) 2 D) 3 E) $\frac{1}{3}$

16. $1 + \frac{1}{1 - \frac{x}{x+1}} = 4 \Rightarrow x = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

17. $\frac{4,8}{0, x} + \frac{1,2}{20} = 4,06 \Rightarrow x = ?$

- A) 16 B) 14 C) 12 D) 8 E) 4

18. $3^x \cdot \sqrt[3]{3} = 9\sqrt{3} \Rightarrow x = ?$

- A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{9}$ D) $\frac{13}{6}$ E) $\frac{11}{2}$

19. $\frac{\frac{1}{2} - x}{1 - x} = 0,1 \Rightarrow x = ?$

- A) $\frac{1}{2}$ B) $\frac{4}{9}$ C) 1 D) 2 E) $\frac{9}{4}$

20. $-2^{-2} + 2^{-1} = 2^{-x+2} \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

Yanıtlar / Answers					
1. E	2. A	3. A	4. C	5. D	6. C
7. A	8. D	9. E	10. D	11. D	12. C
13. D	14. C	15. B	16. A	17. C	18. D
19. B	20. D				

1. $(1,1)^2 - (0,1)^2 = 0, 2 \cdot x \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 6

2. $x \cdot \sqrt[3]{0,027} = \frac{1}{3} \Rightarrow x = ?$

- A) 3 B) 2 C) 1 D)
- $\frac{10}{9}$
- E)
- $\frac{1}{2}$

3. $12! - x \cdot (10!) = 130 \cdot (10!) \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

4. $\frac{x}{0,03} = y, 100 < y < 1000 \Rightarrow ? < x < ?$

- A)
- $3 < x < 10$
- B)
- $3 < x < 30$
- C)
- $3 < x < 100$
-
- D)
- $10 < x < 30$
- E)
- $10 < x < 100$

5. $\left. \begin{array}{l} \frac{5}{x} = \frac{7}{y} \\ \frac{5y}{3} = \frac{7x}{3} + z - 2 \end{array} \right\} \Rightarrow z = ?$

- A) 0 B) 1 C) 2 D) 3 E) 4

6. $\frac{3y-1}{y^2-y} - \frac{2}{y-1} = \frac{3}{y} \Rightarrow \text{ÇK(SS)} = ?$

- A)
- $\{0\}$
- B)
- $\{1\}$
- C)
- $\{2\}$
- D)
- $\emptyset$
- E)
- $\{3\}$

7. $0,42 - 0,03t = 3,33 - t \Rightarrow t = ?$

- A) 0,3 B) 0,7 C) 1 D) 2 E) 3

8. $\frac{\frac{x}{2x-3}}{4} - \frac{\frac{4}{3-2x}}{3} = 4 \Rightarrow x = ?$

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A) 1 B) 2 C) 4 D) 5 E) 6

9. $\frac{1 + \frac{1}{x-1}}{1 - \frac{1}{x}} = 1 \Rightarrow x = ?$

- A)
- $\frac{1}{2}$
- B) -2 C)
- $-\frac{1}{3}$
- D)
- $\frac{2}{3}$
- E) 4

10. $1 - \frac{1}{1 + \frac{1}{x-1}} = 2 \Rightarrow x = ?$

- A) -2 B) -1 C)
- $\frac{1}{2}$
- D)
- $\frac{3}{4}$
- E) 4

$$11. \frac{x - \frac{x}{0.2}}{0.3} + 36 = 0 \Rightarrow x = ?$$

- A) 0,1 B) 0,6 C) 1 D) 2 E) 3

$$12. \frac{1}{x+1} + \frac{1}{x-1} = \frac{x-3}{x^2-1} \Rightarrow x = ?$$

- A) -3 B) -2 C) 0 D) 1 E) 6

$$13. \left(t^2 - \frac{1}{x^2}\right) : \left(t - \frac{1}{x}\right) = 1 \Rightarrow t = ?$$

- A) $\frac{x-1}{x}$ B) $x+1$ C) $\frac{x}{x+1}$
D) $\frac{x-1}{x+1}$ E) $4x$

$$14. \frac{8x^3}{x^3-a^3} : \frac{4x^2}{x^2+ax+a^2} = 3 \Rightarrow x = ?$$

- A) a B) $\frac{a}{2}$ C) $a+2$ D) $2a+2$ E) $3a$

$$15. ax + b^2 = a^2 + bx \Rightarrow x = ?$$

- A) $a-b$ B) a C) $\frac{2b}{a}$
D) $\frac{a}{a-b}$ E) $a+b$

$$16. \left(\frac{1}{x^2} - \frac{1}{a^2}\right) : \left(\frac{1}{x} + \frac{1}{a}\right) = 1 \Rightarrow x = ?$$

- A) a B) $2a$ C) $\frac{a}{a+1}$
D) $\frac{a-1}{a}$ E) $\frac{a+1}{a-1}$

$$17. \frac{y}{2} + \frac{y}{3} + \frac{y}{4} = y-1 \Rightarrow y = ?$$

- A) -24 B) -18 C) -15
D) -14 E) -12

$$18. \frac{x^2-1}{x^2+2x-3} = 2 \Rightarrow x = ?$$

- A) -9 B) -5 C) -1 D) 4 E) 7

$$19. 4 - (1-x)^3 = (3-x)(3-x) \Rightarrow x = ?$$

- A) 0 B) 1 C) 2 D) 3 E) 6

$$20. \frac{x+1}{3} - \frac{3x-1}{5} = x-2 \Rightarrow x = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

Yanıtlar / Answers

1. E	2. D	3. B	4. B	5. C	6. D
7. E	8. E	9. A	10. C	11. E	12. A
13. A	14. E	15. E	16. C	17. E	18. B
19. B	20. B				

1. $\frac{0,22}{x} = \frac{0,11}{0,12} \Rightarrow x = ?$

- A) 0,24 B) 0,22 C) 0,18
D) 0,12 E) 0,11

2. $2 - [2 - (2 - x)] = x \Rightarrow x = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

3. $\frac{x}{x-3} = \frac{x-2}{x-6} \Rightarrow x = ?$

- A) -2 B) -3 C) -4 D) -5 E) -6

4. $\frac{2}{2 + \frac{2}{2 + \frac{2}{x}}} = 2 \Rightarrow x = ?$

- A) $-\frac{1}{2}$ B) $-\frac{1}{4}$ C) $\frac{1}{4}$ D) $\frac{1}{2}$ E) 1

5. $\begin{cases} 2x + 4 = 0 \\ 3x - y + 1 = 0 \end{cases} \Rightarrow y = ?$

- A) -7 B) -5 C) 0 D) 1 E) 2

6. $\begin{cases} \frac{2}{a} + \frac{3}{b} = 3 \\ \frac{4}{a} - \frac{3}{b} = 1 \end{cases} \Rightarrow a = ?$

- A) $\frac{2}{3}$ B) 1 C) $\frac{3}{2}$ D) $\frac{5}{2}$ E) 4

7. $\begin{cases} 2x + y - z = 8 \\ x + 2y + z = 4 \end{cases} \Rightarrow y + z = ?$

- A) -2 B) 0 C) $\frac{2}{5}$ D) $\frac{1}{2}$ E) 2

8. $(a-1)^2 = (a-2)(a-4) \Rightarrow a = ?$

- A) -2 B) $-\frac{7}{4}$ C) $\frac{7}{4}$ D) 2 E) $\emptyset$

$2x + 3y = 16$

9. $\begin{cases} 2y + c = 8 \\ 3x - c = 6 \end{cases} \Rightarrow 2x + y = ?$

- A) 10 B) 9 C) 8 D) 5 E) 1

10. $\frac{12}{x+a} + \frac{2}{x-5} - \frac{2}{x-6} = \frac{2}{3}, x=8 \Rightarrow a = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

$$11. \begin{cases} -2x + 3y - 4z = 32 \\ 3x - 2y + 5z = 24 \end{cases} \Rightarrow x + y + z = ?$$

- A) 28 B) 36 C) 42 D) 48 E) 56

$$12. \begin{cases} a + 10b + 14c = 30 \\ a + 5b + 7c = 32 \end{cases} \Rightarrow a = ?$$

- A) 30 B) 32 C) 34 D) 36 E) 40

$$13. \frac{x+y+9}{x+y} = 10 \Rightarrow x = ?$$

- A) $1+y$ B) $1-y$ C) $\frac{1+y}{2}$
D) $\frac{1+y}{9}$ E) $\frac{1-y}{9}$

$$14. 3 - \frac{1}{2 + \frac{x}{1 - \frac{1}{2}}} = 2 \Rightarrow x = ?$$

- A) -2 B) $-\frac{3}{2}$ C) -1 D) $-\frac{1}{2}$ E) 1

$$15. \begin{cases} \frac{x+y-4}{4} = \frac{5}{4} \\ \frac{x-y+3}{3} = \frac{4}{3} \end{cases} \Rightarrow x = ?$$

- A) 5 B) 6 C) 7 D) 8 E) 10

$$16. \begin{cases} 5x - y + z = 5 \\ 2x + y - z = 2 \end{cases} \Rightarrow 3x + 2z - 2y = ?$$

- A) 2 B) 3 C) 6 D) 10 E) 11

$$17. a - \frac{4a-3}{2} = 4 - \frac{3a-2}{4} \Rightarrow a = ?$$

- A) -15 B) -12 C) 12 D) 15 E) 17

$$18. \frac{1 + \frac{x}{x+2}}{1 - \frac{x}{x-2}} = 1 \Rightarrow x = ?$$

- A) -2 B) -1 C) 0 D) 2 E) 3

$$19. \begin{cases} ax + b = -2 \\ a + bx = 4 \end{cases} \Rightarrow a + b = ?$$

- A) $5x$ B) $\frac{11x}{2}$ C) $3 + 4x$ D) $\frac{3}{x}$ E) $\frac{2}{x+1}$

$$20. \begin{cases} 3x + y + z = 28 \\ x + 3y + z = 25 \\ x + y + 3z = 22 \end{cases} \Rightarrow \frac{x+y}{z} = ?$$

- A) $\frac{2}{7}$ B) $\frac{7}{23}$ C) $\frac{7}{2}$ D) $\frac{23}{7}$ E) $\frac{15}{7}$

Yanıtlar / Answers					
1. A	2. D	3. E	4. A	5. B	6. C
7. B	8. C	9. C	10. C	11. E	12. C
13. B	14. D	15. A	16. B	17. B	18. C
19. E	20. D				

EŞİTSİZLİKLER / INEQUALITIES

1. $a < b \Leftrightarrow a + c < b + c$
2. $a < b$ ve (and) $c > 0 \Leftrightarrow a \cdot c < b \cdot c$
3. $a < b$ ve (and) $c < 0 \Leftrightarrow a \cdot c > b \cdot c$
4. $a < b$ ve (and) $c > 0 \Leftrightarrow \frac{a}{c} < \frac{b}{c}$
5. $a < b$ ve (and) $c < 0 \Leftrightarrow \frac{a}{c} > \frac{b}{c}$
6. $a, b \in \mathbb{R}^+$ ve (and) $a < b \Leftrightarrow \frac{1}{a} > \frac{1}{b}$
7. $c < a$ ve (and) $a < b \Rightarrow c < b$
8. $n \in \mathbb{Z}^+, 0 < b < a \Rightarrow 0 < b^n < a^n$
9. $n \in \mathbb{Z}^+$
 - i. $a < b < 0 \Rightarrow a^{2n-1} < b^{2n-1} < 0$
 - ii. $a < b < 0 \Rightarrow a^{2n} > b^{2n} > 0$
10. $n \in \mathbb{Z}$ ve (and) $n > 1$
 - i. $0 < a < 1 \Rightarrow 0 < a^n < a < 1$
 - ii. $-1 < a < 0$ veya (or) $\Rightarrow a > 1 \Rightarrow a^n > a$
11. $n \in \mathbb{Z}^+, a < -1 \Rightarrow a^{2n-1} < a < a^{2n}$

Örnek / Example:

$$3x - 18 < 0 \Rightarrow \text{ÇK (SS)} = ?$$

Çözüm / Solution:

$$3x - 18 < 0$$

$$3x < 18 \Rightarrow x < 6$$

$$\text{ÇK (SS)} = \{x \mid -\infty < x < 6 \text{ ve (and) } x \in \mathbb{Q}\} \text{ veya (or)}$$

$$\text{ÇK (SS)} = (-\infty, 6)$$

Örnek / Example:

$$\frac{x}{2} - 3 \leq \frac{3x-1}{5} \Rightarrow \text{ÇK (SS)} = ?$$

Çözüm / Solution:

$$\frac{x}{2} - 3 \leq \frac{3x-1}{5}$$

$$10 \cdot \frac{x-6}{2} \leq \frac{3x-1}{5} \cdot 10$$

$$5(x-6) \leq (3x-1) \cdot 2$$

$$5x - 30 \leq 6x - 2$$

$$2 - 30 \leq 6x - 5x$$

$$-28 \leq x$$

$$\text{ÇK (SS)} = [-28, +\infty)$$

Örnek / Example:

$$3 < \frac{5-7x}{6} \leq 5 \Rightarrow \text{ÇK (SS)} = ?$$

Çözüm / Solution:

$$3 < \frac{5-7x}{6} \leq 5$$

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$$6 \cdot 3 < 6 \cdot \frac{5-7x}{6} \leq 6 \cdot 5$$

$$18 < 5 - 7x \leq 30$$

$$-5 + 18 < -5 + 5 - 7x \leq -5 + 30$$

$$13 < -7x \leq 25$$

$$\frac{13}{-7} > \frac{-7x}{-7} \geq \frac{25}{-7}$$

$$\frac{-13}{7} > x \geq -\frac{25}{7}$$

$$\text{ÇK (SS)} = \left[-\frac{25}{7}, -\frac{13}{7} \right)$$

Örnek / Example:

$$\left. \begin{array}{l} 3x + 5 \leq 86 \\ \frac{-2x+1}{3} < 7 \end{array} \right\} \Rightarrow \text{ÇK (SS)} = ?$$

Çözüm / Solution:

$$3x + 5 \leq 86$$

$$\frac{-2x+1}{3} < 7$$

$$3x \leq 81$$

$$-2x + 1 < 21$$

$$x \leq 27$$

$$-2x < 20$$

$$x > -10$$

$$\text{ÇK (SS)} = (-10, 27]$$

Örnek / Example:

$$\left. \begin{array}{l} 3x - 7 \geq 2x + 1 \\ 5x + 3 < 3x - 7 \end{array} \right\} \Rightarrow \text{ÇK (SS)} = ?$$

Çözüm / Solution:

$$3x - 7 \geq 2x + 1$$

$$5x + 3 < 3x - 7$$

$$3x - 2x \geq 7 + 1$$

$$5x - 3x < -3 - 7$$

$$x \geq 8$$

$$2x < -10$$

$$x < -5$$

$$\text{ÇK (SS)} = \emptyset$$



MUTLAK DEĞER / ABSOLUTE VALUE

Tanım: Sayı doğrusunda bir sayının belirttiği noktanın başlangıç noktasından olan uzaklığına bu sayının **mutlak değeri** denir. a'nın mutlak değeri $|a|$ şeklinde gösterilir.

Definition: The distance between a point on the number line indicated by a number and the origin is called the absolute value of that number. The absolute value of a is denoted by $|a|$.



$$\Rightarrow |x| = \begin{cases} x, & x > 0 \\ 0, & x = 0 \\ -x, & x < 0 \end{cases}$$



MUTLAK DEĞERİN TEMEL ÖZELLİKLERİ THE BASIC PROPERTIES of the ABSOLUTE VALUE

1. $n \in \mathbb{N}^+, a \in \mathbb{R} - \{0\}$

$$|a^n| = |a|^n$$

n tek bir doğal sayı ise $|a^n| \neq a^n$

If n is an odd natural number, $|a^n| \neq a^n$

n çift bir doğal sayı ise $|a^n| = a^n$

If n is an even natural number, $|a^n| = a^n$

Örnekler / Examples:

a. $|(x-3)^3| \neq (x-3)^3$

b. $|(x-2)^2| = (x-2)^2$

c. $|(-7)^5| \neq (-7)^5$

d. $|(-3)^6| = (-3)^6 = 3^6$

2. $a, b \in \mathbb{R}^+, a > b$

$$\Rightarrow \begin{cases} |a-b| = a-b \\ |b-a| = -(b-a) = a-b \end{cases}$$

$$|a-b| = |b-a|$$

Örnek / Example:

$$b - 3c < 2a \text{ ve (and) } |b - 3c - 2a| = 3c - 4a$$

$$\Rightarrow \frac{4a+3b}{b-5a} = ?$$

A) 16 B) 18 C) 20 D) 22 E) 24

Çözüm / Solution:

$$b - 3c < 2a$$

$$|b - 3c - 2a| = 3c - 4a$$

$$2a - (b - 3c) = 3c - 4a$$

$$2a - b + 3c = 3c - 4a$$

$$6 \cdot a = b$$

$$\frac{4a+3b}{b-5a} = \frac{4a+3 \cdot 6a}{6a-5a} = \frac{22a}{a} = 22$$

Yanıt / Answer D

Örnek / Example:

$$3 < x < 8 \Rightarrow |2 - x| + |8 - x| = ?$$

A) 2 B) 4 C) 6 D) 8 E) 10

Çözüm / Solution:

$$2 < x \Rightarrow |2 - x| = x - 2$$

$$x < 8 \Rightarrow |8 - x| = 8 - x$$

$$|2 - x| + |8 - x| = x - 2 + 8 - x = 6$$

Yanıt / Answer C

Örnek / Example:

$$4 < x < 8 \Rightarrow |3 - x| - |x - 4| - |x - 8| = ?$$

A) $x + 7$ B) $x - 7$ C) $3x - 7$
D) $3x + 7$ E) $x + 15$

Çözüm / Solution:

$$4 < x \Rightarrow |3 - x| = x - 3$$

$$4 < x \Rightarrow |x - 4| = x - 4$$

$$x < 8 \Rightarrow |x - 8| = 8 - x$$

$$\begin{aligned} |3 - x| - |x - 4| - |x - 8| &= x - 3 - (x - 4) - (8 - x) \\ &= x - 3 - x + 4 - 8 + x \\ &= x - 7 \end{aligned}$$

Yanıt / Answer B

Örnek / Example:

$$4 < x < 9 \Rightarrow |x - |x - 4|| + 3| + 2x + 3 = ?$$

A) $10 + 2x$ B) $8 + 2x$ C) $6 + 2x$
D) $4 + 2x$ E) $2 + x$

Çözüm / Solution:

$$4 < x \Rightarrow |x - 4| = x - 4$$

$$|x - |x - 4|| + 3| + 2x + 3 = |x - (x - 4)| + 3| + 2x + 3$$

$$= |x - x + 4 + 3| + 2x + 3$$

$$= 7 + 2x + 3$$

$$= 10 + 2x$$

Yanıt / Answer A

3. $a, b, c \in \mathbb{R}$

$$|a| + |b| + |c| = 0 \Rightarrow a = 0, b = 0, c = 0$$

Örnek / Example:

$$|x - 3| + |2y + x - 25| = 0 \Rightarrow y = ?$$

- A) 7 B) 11 C) 15 D) 14 E) 23

Çözüm / Solution:

$$|x - 3| + |2y + x - 25| = 0$$

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

$$2y + x - 25 = 0 \Rightarrow 2y + 3 - 25 = 0$$

$$\Rightarrow 2y = 22$$

$$\Rightarrow y = 11$$

Yanıt / Answer B

Örnek / Example:

$$|a - 2| + |b - 4a| + |c - 2b| = 0 \Rightarrow a + 2b + 3c = ?$$

- A) 62 B) 63 C) 64 D) 65 E) 66

Çözüm / Solution:

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

$$b - 4a = 0 \Rightarrow b = 4 \cdot 2 = 8$$

$$c - 2b = 0 \Rightarrow c = 2 \cdot 8 = 16$$

$$a + 2b + 3c = 2 + 2 \cdot 8 + 3 \cdot 16$$

$$= 2 + 16 + 48 = 66$$

Yanıt / Answer E

4. Mutlak değerli bir ifade negatif bir sayıya eşit olamaz.

Absolute value of an expression cannot be equal to a negative number.

$$i. \forall x \in \mathbb{R} \Rightarrow \sqrt{x^2} = |x|$$

$$ii. \forall x \in \mathbb{R} \Rightarrow |x| \geq 0$$

5. i. $|x \cdot y| = |x| \cdot |y|$

$$ii. \left| \frac{x}{y} \right| = \frac{|x|}{|y|}, y \neq 0$$

$$iii. |x + y| \leq |x| + |y|$$

6. i. $|x^n| = |x|^n$

$$ii. |x|^{2n} = x^{2n}, n \in \mathbb{Z}$$

Örnek / Example:

$$x < 0, \frac{\sqrt{x^2}}{x} + 3 = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

Çözüm / Solution:

$$\frac{\sqrt{x^2}}{x} + 3 = \frac{|x|}{x} + 3$$

$$= \frac{-x}{x} + 3$$

$$= -1 + 3$$

$$= 2$$

Yanıt / Answer B

Örnek / Example:

$$x > 3, \frac{\sqrt{x^2 - 6x + 9}}{x^2 - 9} + \frac{1}{x + 3} = ?$$

- A) $x + 1$ B) $x + 3$ C) $\frac{2}{x + 3}$

- D) $\frac{x + 3}{2}$ E) $\frac{x + 3}{4}$

Çözüm / Solution:

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

$$= \frac{x-3}{(x-3) \cdot (x+3)} + \frac{1}{x+3}$$

$$= \frac{2}{x+3}$$

Yanıt / Answer C

Örnek / Example:

$$a, b \in \mathbb{R}, a < \frac{b}{2} \Rightarrow \sqrt{(2a-b)^2} - \sqrt{(a-b)^2} = ?$$

- A) $-a$ B) $\frac{a+b}{2}$ C) $a+b$

- D) $a+2b$ E) $2a+2b$

Çözüm / Solution:

$$= \sqrt{(2a-b)^2} - \sqrt{(a-b)^2}$$

$$= |2a-b| - |a-b|$$

$$= b-2a - (b-a) = -a$$

Yanıt / Answer A



MUTLAK DEĞER DENKLEMLERİ
THE ABSOLUTE VALUE EQUATIONS

1. $a > 0, |x| = a \Rightarrow \begin{cases} x_1 = a \\ x_2 = -a \end{cases}$
2. $b \in \mathbb{R}^+, |x-a| = b \Rightarrow \begin{cases} x-a=b \Rightarrow x_1 = a+b \\ x-a=-b \Rightarrow x_2 = a-b \end{cases}$
3. $\begin{cases} x < 0 \\ y > 0 \end{cases} \Rightarrow |xy| = -xy$
 $\begin{cases} x < 0 \\ y < 0 \end{cases} \Rightarrow |xy| = xy$

Örnek / Example:

$$\left| \frac{2x-1}{5} \right| = 7 \Rightarrow \text{ÇK (SS)} = ?$$

- A) {16, 17} B) {-17, -18} C) {-17, 18}
D) {17, 18} E) {18, -19}

Çözüm / Solution:

$$\begin{aligned} & \left| \frac{2x-1}{5} \right| = 7 \\ & \begin{cases} \frac{2x-1}{5} = 7 & \frac{2x-1}{5} = -7 \\ 2x-1 = 35 & 2x-1 = -35 \\ 2x = 36 & 2x = -34 \\ x_1 = 18 & x_2 = -17 \end{cases} \\ & \text{ÇK (SS)} = \{-17, 18\} \end{aligned}$$

Yanıt / Answer C

Örnek (Example):

$$|x^2 - 1| = 3 \Rightarrow \text{ÇK (SS)} = ?$$

- A) {1, 2} B) {2, 2} C) {-2, 2}
D) {2, 3} E) {-2, -5}

Çözüm / Solution:

$$\begin{aligned} & |x^2 - 1| = 3 \\ & \begin{cases} x^2 - 1 = 3 & x^2 - 1 = -3 \\ x^2 = 4 & x^2 = -2 \\ |x| = 2 & \\ x_1 = 2 & \\ x_2 = -2 \end{cases} \Rightarrow \text{ÇK(SS)} = \{-2, 2\} \end{aligned}$$

Yanıt / Answer C

Örnek / Example:

$$|x-4| + \sqrt{x^2 - 8x + 16} = 12 \Rightarrow x_1 \cdot x_2 = ?$$

- A) -25 B) -20 C) -15 D) -10 E) -5

Çözüm / Solution:

$$\begin{aligned} & |x-4| + \sqrt{(x-4)^2} = 12 \\ & |x-4| + |x-4| = 12 \\ & 2|x-4| = 12 \\ & |x-4| = 6 \\ & \begin{cases} x-4 = 6 & x-4 = -6 \\ x_1 = 10 & x_2 = -2 \end{cases} \\ & x_1 \cdot x_2 = 10 \cdot (-2) = -20 \end{aligned}$$

Yanıt / Answer B

Örnek / Example:

$$A^2 - 7A + 10 = 0 \text{ ve (and) } |x-3| = A \Rightarrow \sum x = ?$$

- A) 8 B) 9 C) 10 D) 11 E) 12

Çözüm / Solution:

$$\begin{aligned} & A^2 - 7A + 10 = 0, (A-2) \cdot (A-5) = 0 \\ & A = 2 \text{ veya (or) } A = 5 \end{aligned}$$

$$\begin{aligned} & |x-3| = 2 \begin{cases} x-3 = 2 \rightarrow x_1 = 5 \\ x-3 = -2 \rightarrow x_2 = 1 \end{cases} \\ & |x-3| = 5 \begin{cases} x-3 = 5 \rightarrow x_3 = 8 \\ x-3 = -5 \rightarrow x_4 = -2 \end{cases} \\ & x_1 + x_2 + x_3 + x_4 = 5 + 1 + 8 - 2 = 12 \end{aligned}$$

Yanıt / Answer E

$$\begin{array}{c}
 a, b \in \mathbb{R}^+ \\
 a < |x| < b \\
 \swarrow \quad \searrow \\
 a < x < b \quad -b < x < -a
 \end{array}$$

Örnek / Example:

$$3 < |x-4| < 7 \Rightarrow \text{ÇK (SS)} = ?$$

- A) $(7, 11) \cup (-3, 1)$
 B) $(7, 11) \cup (-3, -1)$
 C) $(7, 12) \cup (-3, 1)$
 D) $(6, 11) \cup (-4, 1)$
 E) $(6, 12) \cup (-3 - 1)$

Çözüm / Solution:

$$\begin{array}{c}
 3 < |x-4| < 7 \\
 \swarrow \quad \searrow \\
 3 < x-4 < 7 \quad -7 < x-4 < -3 \\
 7 < x < 11 \quad -3 < x < 1 \\
 \text{ÇK(SS)} = (7, 11) \cup (-3, 1)
 \end{array}$$

Yanıt / Answer A

Örnek / Example:

$$|x-2| < |x+3| \Rightarrow \text{ÇK (SS)} = ?$$

- A) $(-\infty, -1)$ B) $(-1, 1)$ C) $(-\frac{1}{2}, 1)$
 D) $(-\frac{1}{2}, \infty)$ E) $(0, +\infty)$

Çözüm / Solution:

$$\begin{aligned}
 |x-2| &< |x+3| \\
 (x-2)^2 &< (x+3)^2 \\
 x^2 - 4x + 4 &< x^2 + 6x + 9 \\
 -5 &< 10x
 \end{aligned}$$

$$-\frac{1}{2} < x$$

$$\text{ÇK(SS)} = (-\frac{1}{2}, +\infty)$$

Yanıt / Answer D

ÇÖZÜMLÜ TEST / TEST WITH SOLUTIONS

1. $2x - 4 < 6 \Rightarrow x = ?$

- A) $x > 10$ B) $x > 6$ C) $x > 5$
 D) $x < 5$ E) $x < 6$

Çözüm / Solution:

$$2x - 4 < 6$$

$$2x < 6 + 4$$

$$2x < 10$$

$$\frac{2x}{2} < \frac{10}{2}$$

$$x < 5$$

Yanıt / Answer D

2. $5 - 2x \leq x + 2 \Rightarrow x \geq ?$

- A) $x \geq -3$ B) $x \geq -2$ C) $x \geq -1$
 D) $x \geq 0$ E) $x \geq 1$

Çözüm / Solution:

$$5 - 2x \leq x + 2$$

$$5 - 2 \leq x + 2x$$

$$3 \leq 3 \cdot x$$

$$\frac{3}{3} \leq \frac{3 \cdot x}{3}$$

$$1 \leq x \Rightarrow x \geq 1$$

Yanıt / Answer E

3. $3x - [(2-x) + 2x] + 1 < x - 5 \Rightarrow x < ?$

- A) $x < -6$ B) $x < -5$ C) $x < -4$
 D) $x < -3$ E) $x < -2$

Çözüm / Solution:

$$3x - [(2-x) + 2x] + 1 < x - 5$$

$$3x - [2 - x + 2x] + 1 < x - 5$$

$$3x - 2 + x - 2x + 1 < x - 5$$

$$2x - 1 < x - 5$$

$$2x - x < -5 + 1$$

$$x < -4$$

Yanıt / Answer C

$$4. \frac{2x-3}{5} < \frac{x-2}{7} + \frac{1}{3} \Rightarrow x < ?$$

$$A) x < \frac{27}{68}$$

$$B) x < \frac{68}{27}$$

$$C) x < \frac{27}{50}$$

$$D) x < \frac{50}{27}$$

$$E) x < \frac{27}{40}$$

Çözüm / Solution:

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

(21) (15) (35)

$$\frac{42x-63}{105} < \frac{15x-30+35}{105}$$

$$42x - 63 < 15x + 5$$

$$42x - 15x < 63 + 5$$

$$27x < 68$$

$$x < \frac{68}{27}$$

Yanıt / Answer B

$$5. \frac{x-1}{4} - 3 \leq \frac{2x-1}{3} + x \Rightarrow ? \leq x$$

$$A) -\frac{35}{17} \leq x$$

$$B) -2 \leq x$$

$$C) -\frac{33}{17} \leq x$$

$$D) -\frac{32}{17} \leq x$$

$$E) -\frac{31}{17} \leq x$$

Çözüm / Solution:

$$\frac{x-1}{4} - \frac{3}{1} \leq \frac{2x-1}{3} + \frac{x}{1}$$

(3) (12) (4) (12)

$$\frac{3x-3-36}{12} \leq \frac{8x-4+12x}{12}$$

$$3x - 39 \leq 20x - 4$$

$$-39 + 4 \leq 20x - 3x$$

$$-35 \leq 17 \cdot x$$

$$\frac{-35}{17} \leq \frac{17 \cdot x}{17}$$

$$-\frac{35}{17} \leq x$$

Yanıt / Answer A

$$6. 4 \cdot (x+1) - 2 > -\frac{1}{2}(x-1) \Rightarrow x \in ?$$

$$A) x < 0$$

$$B) x > \frac{1}{2}$$

$$C) x > -\frac{1}{3}$$

$$D) x < \frac{1}{3}$$

$$E) x < -1$$

Çözüm / Solution:

$$4 \cdot (x+1) - 2 > -\frac{x-1}{2}$$

$$4x + 4 - 2 > \frac{1-x}{2}$$

$$\frac{4x+2}{1} > \frac{1-x}{2}$$

(2)

$$\frac{8x+4}{2} > \frac{1-x}{2}$$

$$8x + 4 > 1 - x$$

$$8x + x > 1 - 4$$

$$\frac{9x}{9} > -\frac{3}{9}$$

$$x > -\frac{1}{3}$$

Yanıt / Answer C

7. $x \in \mathbb{R}, \frac{-3x+6}{x^2+1} < 0 \Rightarrow x \in ?$

- A) $-1 < x < 0$ B) $x > 2$ C) $x < 2$
D) $0 < x < \frac{1}{2}$ E) $-\frac{1}{2} < x < 2$

Çözüm / Solution:

$$\frac{-3x+6}{x^2+1} < 0$$

$$x^2+1 > 0$$

$$-3x+6 < 0$$

$$6 < 3x$$

$$\frac{6}{3} < \frac{3x}{3}$$

$$2 < x$$

Yanıt / Answer B

8. $a < b < 0 \Rightarrow |a+b| + |b-a| = ?$
A) $2b$ B) $-b$ C) $-a$ D) $-2a$ E) $2a$

Çözüm / Solution:

$$a < 0, b < 0 \Rightarrow a+b < 0$$

$$a < b \Rightarrow 0 < b-a$$

$$|a+b| + |b-a|$$

$$= -a-b+b-a$$

$$= -2a$$

Yanıt / Answer D

9. $5x+2 < 3 \cdot (x-1) \Rightarrow x < ?$

- A) $x < -\frac{5}{2}$ B) $x < -3$ C) $x < -\frac{7}{2}$
D) $x < -4$ E) $x < -\frac{9}{2}$

Çözüm / Solution:

$$5x+2 < 3 \cdot (x-1)$$

$$5x+2 < 3x-3$$

$$5x-3x < -3-2$$

$$2x < -5$$

$$\frac{2x}{2} < \frac{-5}{2}$$

$$x < -\frac{5}{2}$$

Yanıt / Answer A

10. $\frac{-2}{1-x} > 0 \Rightarrow x \in ?$

- A) $x < 0$ B) $0 < x < 1$ C) $x < -1$
D) $-1 < x < 0$ E) $1 < x$

Çözüm / Solution:

$$\frac{-2}{1-x} > 0$$

$$1-x < 0$$

$$1 < x$$

Yanıt / Answer E

11. $x+2y-12=0, 2 < y < 6 \Rightarrow ? < x < ?$

- A) $0 < x < 6$ B) $0 < x < 8$ C) $2 < x < 6$
D) $2 < x < 8$ E) $8 < x < 10$

Çözüm / Solution:

$$x+2y-12=0$$

$$2y=12-x$$

$$\frac{2y}{2} = \frac{12-x}{2}$$

$$y = \frac{12-x}{2}$$

$$2 < y < 6 \Rightarrow 2 < \frac{12-x}{2} < 6$$

$$4 < 12-x < 12$$

$$-8 < -x < 0$$

$$8 > x > 0$$

Yanıt / Answer B

12. $a < 0 < b \Rightarrow \sqrt{a^2-2ab+b^2} + |b-a| = ?$

- A) $2b$ B) $2a-b$ C) $2b-2a$
D) $2a-2b$ E) $a-b$

Çözüm / Solution:

$$a < b \Rightarrow a-b < 0$$

$$\Rightarrow b-a > 0$$

$$\begin{aligned} \sqrt{a^2-2ab+b^2} + |b-a| &= \sqrt{(a-b)^2} + |b-a| \\ &= |a-b| + |b-a| \\ &= -a+b+b-a \\ &= 2b-2a \end{aligned}$$

Yanıt / Answer C

13. $|4-3x|=2 \Rightarrow \text{ÇK(SS)} = ?$

- A) $\left\{\frac{2}{3}, 2\right\}$ B) $\left\{\frac{1}{3}, 2\right\}$ C) $\left\{\frac{2}{3}, 1\right\}$
D) $\{1, 2\}$ E) $\left\{\frac{1}{3}, 1\right\}$

Çözüm / Solution:

$$|4-3x|=2 \Rightarrow 4-3x=2 \text{ veya (or) } -4+3x=2$$

$$4-2=3x \quad 3x=4+2$$

$$2=3 \cdot x \quad 3x=6$$

$$x=2$$

$$\frac{2}{3}=x$$

$$SS = \left\{\frac{2}{3}, 2\right\}$$

Yanıt / Answer A

14. $1 < x < 3 \Rightarrow \sqrt{x^2-6x+9} - \sqrt{x^2-2x+1} = ?$

- A) $2x-3$ B) $2x-4$ C) $2x-5$
D) $-2x+4$ E) $-2x+5$

Çözüm / Solution:

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

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

$$\sqrt{x^2-6x+9} - \sqrt{x^2-2x+1} = \sqrt{(x-3)^2} - \sqrt{(x-1)^2}$$

$$= |x-3| - |x-1|$$

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

$$= -2x+4$$

Yanıt / Answer D

15. $a < b < 0 < c \Rightarrow$

$$\sqrt{a^2} + \sqrt{(a-b)^2} - \sqrt{(c-b)^2} + \sqrt{(c-a)^2} = ?$$

- A) $2b-3a$ B) $2b-a$ C) $3b-a$
D) $3b-2a$ E) $2b-2a$

Çözüm / Solution:

$$a < b \Rightarrow a-b < 0$$

$$b < c \Rightarrow 0 < c-b$$

$$a < c \Rightarrow 0 < c-a$$

$$\sqrt{a^2} + \sqrt{(a-b)^2} - \sqrt{(c-b)^2} + \sqrt{(c-a)^2}$$

$$= |a| + |a-b| - |c-b| + |c-a|$$

$$= -a + (-a+b) - (c-b) + (c-a)$$

$$= -a-a+b-c+b+c-a$$

$$= 2b-3a$$

Yanıt / Answer A

16. $x \in \mathbb{R}, |3x-12|=12-3x \Rightarrow x \leq ?$

- A) $x \leq 3$ B) $x \leq 4$ C) $x \leq 5$
D) $x \leq 6$ E) $x \leq 7$

Çözüm / Solution:

$$|3x-12|=12-3x \Rightarrow 3x-12 \leq 0$$

$$\Rightarrow 3x \leq 12$$

$$\Rightarrow \frac{3x}{3} \leq \frac{12}{3}$$

$$x \leq 4$$

Yanıt / Answer B

17. $|5-x|+x=7 \Rightarrow \text{ÇK (SS)} = ?$

- A) $\{4\}$ B) $\{5\}$ C) $\{6\}$ D) $\{7\}$ E) $\{8\}$

Çözüm / Solution:

$$|5-x|+x=7$$

$$5-x+x=7 \text{ veya (or) } -5+x+x=7$$

$$5 \neq 7$$

$$2x=7+5$$

$$x=6$$

Yanıt / Answer C

18. $|2x-1| < 5 \Rightarrow ? < x < ?$

- A) $-3 < x < 5$ B) $-5 < x < 0$ C) $-5 < x < 1$
D) $-3 < x < 2$ E) $-2 < x < 3$

Çözüm / Solution:

$$|2x-1| < 5 \Rightarrow -5 < 2x-1 < 5$$

$$-4 < 2x < 6$$

$$-2 < x < 3$$

Yanıt / Answer E

19. $|3-5x| \leq 13 \Rightarrow ? \leq x \leq ?$

- A) $-5 \leq x < -2$ B) $-3 \leq x \leq \frac{11}{3}$ C) $-3 \leq x \leq 3$

- D) $-2 \leq x \leq \frac{16}{5}$ E) $-2 \leq x \leq 4$

Çözüm / Solution:

$$|3-5x| \leq 13 \Rightarrow -13 \leq 3-5x \leq 13$$

$$-16 \leq -5x \leq 10$$

$$\frac{16}{5} \geq x \geq -2$$

Yanıt / Answer D

20. $|2 - x| > 10 \Rightarrow x \in ?$

- A) $x < -10, x > 10$ B) $x < -6, x > 10$
 C) $x < -6, x > 12$ D) $x < -8, x > 10$
 E) $x < -8, x > 12$

Çözüm / Solution:

$$\begin{aligned} |2 - x| &> 10 \\ 2 - x &> 10 \quad \text{veya (or)} \quad -2 + x > 10 \\ 2 - 10 &> x \quad \text{veya (or)} \quad x > 10 + 2 \\ -8 &> x \quad \text{veya (or)} \quad x > 12 \end{aligned}$$

Yanıt / Answer E

21. $x < -1$ ve (and) $2x + |x + 1| = -6 \Rightarrow x = ?$

- A) -8 B) -7 C) -6 D) -5 E) -4

Çözüm / Solution:

$$\begin{aligned} x < -1 &\Rightarrow x + 1 < 0 \\ 2x + 1x + 11 &= -6 \\ 2x - x - 1 &= -6 \\ x &= -6 + 1 \\ x &= -5 \end{aligned}$$

Yanıt / Answer D

22. $|2x + 7| < 9 \Rightarrow ? < x < ?$

- A) $-8 < x < 1$ B) $-4 < x < -5$ C) $-8 < x < 8$
 D) $-5 < x < 6$ E) $-7 < x < 9$

Çözüm / Solution:

$$\begin{aligned} |2x + 7| < 9 &\Rightarrow -9 < 2x + 7 < 9 \\ -16 &< 2x < 2 \\ \frac{-16}{2} &< \frac{x}{2} < \frac{2}{2} \\ -8 &< x < 1 \end{aligned}$$

Yanıt / Answer A

YÖS SORULARI / YÖS QUESTIONS

1. $x < -5, |x + 5| = 3 \Rightarrow x = ?$

- A) -2 B) -4 C) -6 D) -7 E) -8

(YÖS 1982)

Çözüm / Solution:

$$\begin{aligned} x < -5 &\Rightarrow x + 5 < 0 \\ |x + 5| &= 3 \\ -x - 5 &= 3 \\ -x &= 3 + 5 \\ -x &= 8 \\ x &= -8 \end{aligned}$$

Yanıt / Answer E

2. $|x - 3| + 4 = 5 \Rightarrow x \in ?$

- A) $\{-2, 4\}$ B) $\{-6, 2\}$ C) $\{-4, 4\}$
 D) $\{6, 12\}$ E) $\{2, 4\}$

(YÖS 1983)

Çözüm / Solution:

$$\begin{aligned} |x - 3| + 4 &= 5 \Rightarrow |x - 3| = 5 - 4 \\ |x - 3| &= 1 \\ x - 3 &= 1 \quad \text{veya (or)} \quad -x + 3 = 1 \\ x &= 4 \quad \text{veya (or)} \quad -x = -2 \\ x &= 2 \end{aligned}$$

$S = \{2, 4\}$

Yanıt / Answer E

3. $-5 < x < -1, |x + 1| + |x + 5| + a = 7 \Rightarrow a = ?$

- A) 1 B) 3 C) 5 D) 7 E) 11

(YÖS 1983)

Çözüm / Solution:

$$\begin{aligned} -5 < x &\Rightarrow 0 < x + 5 \\ x < -1 &\Rightarrow x + 1 < 0 \\ |x + 1| + |x + 5| + a &= 7 \\ -x - 1 + x + 5 + a &= 7 \\ 4 + a &= 7 \\ a &= 3 \end{aligned}$$

Yanıt / Answer B

4. $|x+1| \leq 5 \Rightarrow ? \leq x \leq ?$
 A) $-6 \leq x \leq 5$ B) $-6 \leq x \leq 4$ C) $-7 \leq x \leq 5$
 D) $-7 \leq x \leq 4$ E) $5 \leq x \leq 6$
 (YÖS 1984)

Çözüm / Solution:

$$|x+1| \leq 5 \Rightarrow -5 \leq x+1 \leq 5$$

$$-6 \leq x \leq 4$$

Yanıt / Answer B

5. $|3x+4| < 5 \Rightarrow ? < x < ?$
 A) $-6 < x < \frac{1}{3}$ B) $-6 < x < 3$ C) $\frac{1}{3} < x < 3$
 D) $-3 < x < \frac{1}{3}$ E) $3 < x < 6$
 (YÖS 1985)

Çözüm / Solution:

$$|3x+4| < 5 \Rightarrow -5 < 3x+4 < 5$$

$$-9 < 3x < 1$$

$$\frac{-9}{3} < \frac{3x}{3} < \frac{1}{3}$$

$$-3 < x < \frac{1}{3}$$

Yanıt / Answer D

6. $|2x-a| < a, a > 0 \Rightarrow ? < x < ?$
 A) $0 < x < a$ B) $2 < x < a$ C) $a < x < 2a$
 D) $\frac{a}{4} < x < \frac{a}{2}$ E) $\frac{a}{2} < x < a$
 (YÖS 1986)

Çözüm / Solution:

$$|2x-a| < a \Rightarrow -a < 2x-a < a$$

$$0 < 2x < 2a$$

$$\frac{0}{2} < \frac{2x}{2} < \frac{2a}{2}$$

$$0 < x < a$$

Yanıt / Answer A

7. $a < 0 < b \Rightarrow |2a-b| + |2b-a| = ?$
 A) $3(b-a)$ B) $2(a-b)$ C) $b-a$
 D) $a-b$ E) $a+b$
 (YÖS 1988)

Çözüm / Solution:

$$a < 0$$

$$2a < 0$$

$$2a-b < 0$$

$$0 < b$$

$$0 < 2b$$

$$0 < 2b-a$$

$$|2a-b| + |2b-a| = -2a+b+2b-a$$

$$= -3a+3b$$

$$= 3(b-a)$$

Yanıt / Answer A

8. $x, y \in \mathbb{Z}^+, x > y, |y-x| + |y-1| = 5 \Rightarrow x = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6
 (YÖS 1989)

Çözüm / Solution:

$$y < x \Rightarrow y-x < 0$$

$$y-1 \geq 0$$

$$|y-x| + |y-1| = 5$$

$$-y+x+y-1=5$$

$$x=6$$

Yanıt / Answer E

9. $b-c > 0, 2b=a+1, \frac{a}{2}+x=c \Rightarrow x \in ?$
 A) $(-2, \infty)$ B) $(-\infty, -\frac{1}{2})$ C) $(\frac{1}{2}, \infty)$
 D) $(-\infty, \frac{1}{2})$ E) $(-\infty, 2)$
 (YÖS 1990)

Çözüm / Solution:

$$\frac{a}{2} + \frac{x}{1} = c$$

(2)

$$\frac{a+2x}{2} = \frac{c}{1}$$

$$a+2x=2c$$

$$b-c>0 \Rightarrow 2b-2c>0$$

$$a+1-(a+2x)>0$$

$$a+1-a-2x>0$$

$$1>2x$$

$$x < \frac{1}{2} = \left(-\infty, \frac{1}{2}\right)$$

Yanıt / Answer D

$$10. |x+7|=12 \Rightarrow x_1+x_2=?$$

$$A) -16 \quad B) -14 \quad C) -12 \quad D) -10 \quad E) 8$$

(YÖS 1992)

Çözüm / Solution:

$$|x+7|=12 \Rightarrow$$

$$x+7=12 \text{ veya (or) } -x-7=12$$

$$x_1=5 \text{ veya (or) } -x=19$$

$$x_2=-19$$

$$x_1+x_2=5+(-19)$$

$$=-14$$

Yanıt / Answer B

$$11. x < 0 \Rightarrow |x-1|+|2-x|-|x|=?$$

$$A) 1-x \quad B) 3-x \quad C) 1-2x$$

$$D) 3-2x \quad E) 3-3x$$

(YÖS 1997)

Çözüm / Solution:

$$x < 0 \Rightarrow x-1 < 0, 2-x > 0$$

$$|x-1|+|2-x|-|x|=-x+1+2-x-(-x)$$

$$=-x+1+2-x+x$$

$$=3-x$$

Yanıt / Answer B

$$12. x^2+y^2-2xy-4=0 \Rightarrow |x-y|=?$$

$$A) -3 \quad B) -1 \quad C) 1 \quad D) 2 \quad E) 4$$

(YÖS 2002)

Çözüm / Solution:

$$x^2+y^2-2xy-4=0$$

$$(x-y)^2-2^2=0$$

$$(x-y+2) \cdot (x-y-2)=0$$

$$\Rightarrow x-y+2=0 \text{ veya (or) } x-y-2=0$$

$$x-y=-2$$

$$x-y=2$$

$$\Rightarrow |x-y|=2$$

Yanıt / Answer D

$$13. |x-y+1|+\sqrt{9x^2-6xy+y^2}=0 \Rightarrow x+y=?$$

$$A) \frac{1}{2} \quad B) \frac{3}{2} \quad C) 1 \quad D) 2 \quad E) 3$$

(YÖS 2003)

Çözüm / Solution:

$$|x-y+1|+\sqrt{(3x-y)^2}=0$$

$$\Rightarrow |x-y+1|+|3x-y|=0$$

$$\Rightarrow 3x-y=0, x-y+1=0$$

$$\Rightarrow y=3x, x-3x+1=0$$

$$-2x+1=0$$

$$x=\frac{1}{2}$$

$$y=3 \cdot \left(\frac{1}{2}\right)$$

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

$$x+y=\frac{1}{2}+\frac{3}{2}=2$$

Yanıt / Answer D

$$14. x^{1007} < 0$$

$$|x|+|5-x|+|6-x|+|7-x|+|x-9|=1007$$

$$\Rightarrow x=?$$

$$A) -201$$

$$B) -199$$

$$C) -196$$

$$D) 176$$

$$E) 186$$

(YÖS 2007)

Çözüm / Solution:

$$x^{1007} < 0 \Rightarrow x < 0$$

$$|x|+|5-x|+|6-x|+|7-x|+|x-9|=1007$$

$$-x+5-x+6-x+7-x+9-x=1007$$

$$-5x=980 \Rightarrow x=-196$$

Yanıt / Answer C

1. $2 \leq x < 9$,
 $-3 < y \leq 4$
 $\Rightarrow \min(4x - 3y) = ?$

Yanıt / Answer : -4

2. $\frac{1}{10}(2x+1) < \frac{1}{2} - \frac{x+8}{5} \Rightarrow \text{ÇK(SS)} = ?$

Yanıt / Answer : $(-\infty, -3)$

3. $-\frac{2}{1-x} > 0 \Rightarrow \text{ÇK(SS)} = ?$

Yanıt / Answer : $(1, \infty)$

4. $x < -1 \Rightarrow ||1-x| + |x| - 3| + 2x = ?$

Yanıt / Answer : -2

5. $-5 < x < -1$,
 $|x+1| + |x+5| + y = 7 \Rightarrow y = ?$

Yanıt / Answer : 3

6. $|3x-12| = 12-3x \Rightarrow \text{ÇK(SS)} = ?$

Yanıt / Answer : $(-\infty, 4)$

7. $|6-|4x+3|| = 7 \Rightarrow \text{ÇK(SS)} = ?$

Yanıt / Answer : $\left\{-4, \frac{5}{2}\right\}$

8. $x \in \mathbb{Z}$
 $3 < |2x-1| < 7 \Rightarrow \sum x = ?$

Yanıt / Answer : 1

9. $x > 0,$
 $| -x - 3 | - | 3x + 7 | + | -8 | = 0 \Rightarrow x = ?$

Yanıt / Answer : 2

10. $\frac{4}{x} \leq \frac{3}{x-2} \Rightarrow \max(x) = ?$

Yanıt / Answer : 8

11. $\frac{(x-2) \cdot (x+3)^2}{x^2 - 2x - 3} \leq 0 \Rightarrow \text{ÇK(SS)} = ?$

Yanıt / Answer : $(-\infty, 1) \cup (-3, 2)$

12. $|x| \leq 2 \Rightarrow |x+2| + |x-4| = ?$

Yanıt / Answer : 6

13. $\left| \frac{3x-6}{x} \right| = \sqrt{(-5)^2} \Rightarrow \text{ÇK(SS)} = ?$

Yanıt / Answer : $\left\{ -3, \frac{3}{4} \right\}$

14. $|x^2 - 3x - 4| = |x - 4| \Rightarrow \sum x = ?$

Yanıt / Answer : 2

15. $\frac{|2x-1|}{|x-3|} = 0 \Rightarrow x = ?$

Yanıt / Answer : $\frac{1}{2}$

16. $x \in \mathbb{Z}$

$\frac{3x-4}{2} - 3 < \frac{5+x}{3} + x \Rightarrow \max(x) = ?$

Yanıt / Answer : 39

1. $\frac{|-5| - |-4| + 3| + 5}{5 + |-4|} = ?$
 A) 0 B) 1 C) 2 D) 3 E) 4
 $+3 - 14 = -11$
2. $|4 - \sqrt{8}| + |2 - \sqrt{8}| = ?$
 A) 0 B) 1 C) 2 D) $\sqrt{2}$ E) $2\sqrt{2}$
3. $x < 0 < y \Rightarrow |x| - |y| - |x - y| - |y - x| = ?$
 A) $y - 3x$ B) 0 C) $x + 3y$
 D) $x - 3y$ E) $x + y$
4. $a < \frac{3}{4} \Rightarrow |4a - 3| - |12 - 4a| = ?$
 A) -10 B) -9 C) -3 D) 8 E) 12
5. $a < -2 \Rightarrow \sqrt{a^2 - 7a + 18} + \sqrt{a^2 + 4a + 4} = ?$
 A) $4 - a$ B) $a - 4$ C) $2 - a$
 D) $2 + a$ E) $a + 4$
6. $4(x + 1) - 2 < x - 1 \Rightarrow x \in ?$
 A) $x < 0$ B) $x > \frac{1}{2}$ C) $x > -\frac{1}{3}$
 D) $x < \frac{1}{3}$ E) $x < -1$

7. $a - \frac{a+4}{3} < 4 \Rightarrow a \in ?$

- A) $a < 0$ B) $a > 8$ C) $a < \frac{10}{3}$
 D) $a > 10$ E) $a < 8$

$\frac{2a-4}{3} < 4$
 $2a-4 < 12$
 $2a < 16$
 $a < 8$

8. $|y \cdot (y-1)| = 2 \Rightarrow \text{ÇK(SS)} = ?$

- A) $\{-2, -1\}$ B) $\{-1\}$ C) $\{-1, 2\}$
 D) $\{0, 2\}$ E) $\{0, 1\}$

9. $||x-3| - 4| = 7 \Rightarrow \text{ÇK(SS)} = ?$

- A) $\{-8\}$ B) $\{-1, 2\}$ C) $\{11\}$
 D) $\{-8, 14\}$ E) $\{14\}$

10. $|6 - |4x+3|| = 7 \Rightarrow \text{ÇK(SS)} = ?$

- A) $\{-4, \frac{5}{2}\}$ B) $\{-4, 5\}$ C) $\{-2, \frac{5}{2}\}$
 D) $\{-4, 5\}$ E) $\{-5, 2\}$

11. $-6 < a < -2$ ve (and)

$|a+2| + |a+6| + x = 10 \Rightarrow x = ?$

- A) 6 B) a C) -2a D) 8 E) 10

12. $|3 - 2x| = x - 3 \Rightarrow \text{ÇK(SS)} = ?$

- A) $\{0\}$ B) $\{2\}$ C) $\emptyset$
 D) $\{-1\}$ E) $\{-2\}$

13. $2a - 4 = |a - 1| \Rightarrow a = ?$

- A) 0 B) 1 C) 2 D) 3 E) 4

14. $|4 - 2x| \leq 8 \Rightarrow \text{ÇK (SS)} = ?$

- A) (3, 5) B) $(-\infty, 6)$ C) $[-2, +\infty)$
D) (-2, 6) E) $[-2, 6]$

15. $\left| \frac{x+5}{4} \right| \leq 4 \Rightarrow \text{ÇK (SS)} = ?$

- A) $(-\infty, 0)$ B) $[-21, 11]$ C) $(-10, 21]$
D) $[-2, 30)$ E) $(-10, 21]$

16. $3 < |2x - 1| < 7, x \in \mathbb{Z} \Rightarrow \sum x = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

17. $\begin{cases} x + y = 0 \\ x^2 \cdot y < 0 \end{cases} \Rightarrow |y - x| - |x - 3y| = ?$

- A) -2y B) $4y - 2x$ C) $2x - 4y$
D) 2x E) 2y

18. $|3x - 4| < 5$ eşitsizliğini sağlayan kaç tamsayı vardır?

How many integer x values are there in the solution set?

- A) 1 B) 2 C) 3 D) 4 E) 5

19. $x < y < 0 < z$ ve (and)

$|y - x| + |y - z| + 2 \cdot |x - z| = 3 \Rightarrow z - x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

20. $1 \leq |2x - 1| < 5 \Rightarrow \text{ÇK (SS)} = ?$

- A) $(-1, 0) \cup (2, 3)$ B) $(1, 3) \cup (-2, 1)$
C) $(1, 3] \cup (0, 2)$ D) $[1, 3) \cup (-2, 0]$
E) $[-1, 1] \cup (1, 3)$

21. $|3 + |x^2 + 4|| = 23 \Rightarrow \sum x = ?$

- A) 0 B) 2 C) 5 D) 9 E) 14

22. $2 \cdot \frac{x^4}{|x^3|} + 3x = 20 \Rightarrow \sum x = ?$

- A) 4 B) 8 C) 12 D) 16 E) 24

23. $|3 + 2x| = 15 \Rightarrow \sum x = ?$

- A) 9 B) 6 C) 3 D) 0 E) -3

Yanıtlar / Answers

1. B	2. C	3. D	4. B	5. A	6. E
7. E	8. C	9. D	10. A	11. A	12. C
13. D	14. E	15. B	16. D	17. E	18. C
19. A	20. D	21. A	22. E	23. E	

1. $-4 < x < 2 \Rightarrow |x-2| + |x+4| + 1 = ?$

- A) 3 B) 4 C) 5 D) 6 E) 7

$$-x+2+x+4+1$$

2. $x < 0 < y < -z \Rightarrow |x-y| - |y-z| - |x+z| = ?$

- A)
- $x-z$
- B) 0 C)
- $2y$
-
- D)
- $2z$
- E)
- $2(x+y+z)$

$$-x+y-$$

3. $x < 0 \Rightarrow |x+2| - |x| = ?$

- A) 2 B)
- x
- C)
- $2x+2$
-
- D)
- $2-x$

$$\begin{aligned} &|-x+2| \\ &-x+2-x \\ &-2x+2 \end{aligned}$$

4. $x < 0 < y \Rightarrow \sqrt{x^2} - |x-y| + \sqrt{y^2} = ?$

- A)
- $-2x$
- B)
- $-2y$
- C)
- $x-y$
-
- D)
- $2(x+y)$
- E) 0

5. $|2x-3|=5 \Rightarrow \text{ÇK (SS)} = ?$

- A)
- $\{4\}$
- B)
- $\{-1\}$
- C)
- $\{-1, 4\}$
-
- D)
- $\{1, 4\}$
- E)
- $\{-1, 2\}$

6. $||2x+1|+4|=3 \Rightarrow \text{ÇK (SS)} = ?$

- A)
- $\{-1\}$
- B)
- $\{-4, -1\}$
- C)
- $\{-1, 1, 4\}$
-
- D)
- $\emptyset$
- E)
- $\{-4, -1, 4\}$

7. $x < y < 0 < z \Rightarrow$

$$\sqrt{x^2-2xy+y^2} - \sqrt{x^2-2xz+z^2} + \sqrt{y^2-2yz+z^2} = ?$$

- A) 0 B)
- $3x$
- C)
- y
-
- D)
- $x+y+z$
- E)
- z

8. $A = \{x | \sqrt{(x-3)^2} = 3-x, x \in \mathbb{R}\} \Rightarrow x \in ?$

- A)
- $(0, 3)$
- B)
- $(-\infty, 3]$
- C)
- $[3, +\infty)$
-
- D)
- $(-3, 3)$
- E)
- $\mathbb{R}$

9. $| -3x+7 | = 5 \Rightarrow \sum x = ?$

- A) 6 B)
- $\frac{4}{3}$
- C)
- $\frac{8}{3}$
- D) 12 E)
- $\frac{14}{3}$

$$-3x+7=5$$

$$-3x=-2$$

$$x=\frac{2}{3}$$

$$-3x+7=-5$$

$$-3x=-12$$

$$x=4$$

10. $x \in \mathbb{R}, x < -2 \Rightarrow$

$$x + \sqrt{x^2+5x+1} + \sqrt{x^2-6x+9} = ?$$

- A)
- $x-2$
- B)
- x
- C)
- $-x-2$
-
- D)
- $2-x$
- E)
- -2

11. $2 < x < 6 \Rightarrow |x-2| + |x-6| + 2x = 10 \Rightarrow x = ?$

- A) 3 B) 4 C) 5 D) 6 E) 8

12. $|x|-2=|x-2| \Rightarrow \text{ÇK (SS)} = ?$

- A)
- $\mathbb{R}$
- B)
- $(-\infty, 0)$
- C)
- $(-2, +\infty)$
-
- D)
- $[2, +\infty)$
- E)
- $\emptyset$

13. $|3 - |x - 1|| = 2 \Rightarrow \sum x = ?$

- A) 0 B) 2 C) 3 D) 4 E) 5

14. $|2x - 6| + |4y + 20| = 0 \Rightarrow x + y = ?$

- A) -2 B) -1 C) 3 D) 8 E) 14

15. $|x| + |y| + |z| = 2, x, y, z \in \mathbb{Z}$
 $\Rightarrow x \cdot y \cdot z = ?$

- A) -1 B) 0 C) 2 D) 4 E) 6

16. $x > 2, |3x + |2 - x|| = 10 \Rightarrow \text{ÇK (SS)} = ?$

- A) {2} B) {3} C) {4}
 D) {-2, 2} E) {2, 3}

17. $a < b < 0 < c \Rightarrow \frac{|a-b| + |c-b|}{|-c| + |-a|} = ?$

- A) 1 B) 2 C) -1 D) a E) $2a - b$

18. $|2x - 4| + |y - 5| + |z + 2| = 0$
 $\Rightarrow x + y + z = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

19. $x < -5 \Rightarrow |5x + |4x - 5|| + x = ?$

- A) -5 B) $-8x + 5$ C) $-2x - 5$
 D) -x E) $-2x + 5$

20. $3 < x < 4 \Rightarrow \sqrt{x^2 - 5x + 5} + \sqrt{x^2 - 8x + 16} + x = ?$

- A) $2x - 3$ B) $-2x + 3$ C) 5
 D) 3 E) $4x + 2$

21. $\sqrt{(2 - |x|)^2} = 1 \Rightarrow \sum x^2 = ?$

- A) 74 B) 52 C) 50 D) 34 E) 20

22. $|x - 1|^{(x^2 + x - 2)} = 1 \Rightarrow \text{ÇK (SS)} = ?$

- A) {-2, 1} B) {2, -1} C) {-2, 0, 2}
 D) {2} E) {-1}

23. $|3x - 2| = 2x - 1 \Rightarrow \text{ÇK (SS)} = ?$

- A) {1} B) $\left\{\frac{3}{5}\right\}$ C) $\left\{1, \frac{3}{5}\right\}$
 D) {0, 1} E) $\left\{\frac{3}{5}, 2\right\}$

24. $\frac{x+3}{|x-1|+2} = \frac{1}{2} \Rightarrow \text{ÇK(SS)} = ?$

- A) {-5, -1} B) {-5} C) {-1}
 D) $\emptyset$ E) {-1, 5}

Yanıtlar / Answers					
1. E	2. D	3. A	4. E	5. C	6. D
7. A	8. B	9. E	10. E	11. A	12. D
13. D	14. A	15. B	16. B	17. A	18. D
19. A	20. A	21. E	22. C	23. C	24. C

1. $x < 0 < y \Rightarrow |x| - |y| - |x - y| - |y - x| = ?$

- A) $-3x + y$ B) 0 C) $x + 3y$
D) $x - 3y$ E) $x + y$

2. $|3 - 2\sqrt{3}| + |4 - 2\sqrt{3}| = ?$

- A) 0 B) 1 C) 2 D) $\sqrt{2}$ E) $2\sqrt{2}$

3. $3 \cdot |-3 + 4| - (-2) \cdot |-4 \cdot |-3| = ?$

- A) -3 B) -2 C) -1 D) 0 E) 1

4. $x < 3 \Rightarrow |x - 3| + 5x - 4 = ?$

- A) $6x - 1$ B) $6x - 7$ C) $4x + 2$
D) $2x + 1$ E) $4x - 1$

5. $a < \frac{1}{2} \Rightarrow |1 - 2a| - |-2a + 6| = ?$

- A) -10 B) -9 C) -5 D) 8 E) 12

6. $x > 0, y < 0 \Rightarrow \sqrt{x^2} + \sqrt{y^2} = ?$

- A) $2x$ B) $x - y$ C) $x + y$ D) $2y$ E) 0

7. $a < -2 \Rightarrow \sqrt{a^2 + 4a + 4} = ?$

- A) $4 - a$ B) $-2 - a$ C) $2 + a$
D) $a + 4$ E) $a - 4$

8. $1 < a < 2 \Rightarrow \sqrt{a^2 - 4a + 4} - \sqrt{a^2 - 2a + 1} + 1 = ?$

- A) $5 - a$ B) $3 - a$ C) $2(a + 2)$
D) $4 - a$ E) $2(2 - a)$

9. $a < 0, b > 0 \Rightarrow \sqrt{9a^2} - \sqrt{4b^2} - |a - b| = ?$

- A) $-(a + b)$ B) $-(2a + 3b)$ C) $3a - b$
D) $2(a - b)$ E) $-2(2a - b)$

10. $a < 0 \Rightarrow \frac{|-5a| + |a| + |-4a|}{|a|} = ?$

- A) $10a$ B) $-12a$ C) 15 D) -10 E) 10

11. $|2 - 4x| = 6 \Rightarrow \text{ÇK (SS)} = ?$

- A) $\{-8\}$ B) $\{-2, 1\}$ C) $\{1\}$
D) $\{-1, 2\}$ E) $\{14\}$

12. $|5x - 3| = x - 9 \Rightarrow \text{ÇK (SS)} = ?$

- A) $\left\{\frac{3}{2}\right\}$ B) $\{2\}$ C) $\{3\}$ D) $\left\{-\frac{3}{2}\right\}$ E) $\emptyset$

13. $|x-1|-|x+1|=1 \Rightarrow \text{ÇK (SS)} = ?$

- A) $\{0\}$ B) $\{-\frac{1}{2}\}$ C) $\{-\frac{2}{3}\}$ D) $\{2\}$ E) $\{3\}$

14. $||4x+3|+|5-x||=7 \Rightarrow x=?$

- A) -2 B) -1 C) 0 D) 2 E) 9

15. $n \in \mathbb{Z}^+, x < 0 < y \Rightarrow \sqrt[2n]{x^{2n}} + \sqrt[2n]{y^{2n+1}} = ?$

- A) $x-y$ B) $y-x$ C) $-x-y$
D) $x+y$ E) xy

16. $\frac{1}{|x+1|+|4+4x|} = \frac{4}{5} \Rightarrow x_1 \cdot x_2 = ?$

- A) 5 B) $\frac{12}{25}$ C) $\frac{15}{16}$
D) 8 E) 12

17. $|6-|4x+3||=7 \Rightarrow \sum x = ?$

- A) -4 B) 3 C) $-\frac{2}{7}$ D) $\frac{4}{5}$ E) $-\frac{3}{2}$

18. $\frac{x+5}{|x-5|-3} = 2 \Rightarrow \text{ÇK (SS)} = ?$

- A) $\{-\frac{1}{3}, 5\}$ B) $\{1, 21\}$ C) $\{-\frac{1}{3}, 21\}$
D) $\{\frac{1}{3}, \frac{2}{5}\}$ E) $\{3\}$

19. $|x^2+3|=|x+5| \Rightarrow \sum x = ?$

- A) -2 B) 0 C) 1 D) 2 E) 5

20. $|3x-5|=-x \Rightarrow \text{ÇK (SS)} = ?$

- A) $\{1\}$ B) $\{\frac{5}{2}\}$ C) $\{\frac{4}{3}\}$
D) $\emptyset$ E) $\{\frac{2}{3}\}$

21. $|x-b|=|4x+b| \Rightarrow \sum x = ?$

- A) $-3b$ B) $2b$ C) $-\frac{2b}{3}$
D) $\frac{b}{2}$ E) $-\frac{5}{2}$

22. $|a^2-16|-|a+4|=0 \Rightarrow \text{ÇK (SS)} = ?$

- A) $\{-2, 4, 3\}$ B) $\{-4, 3, 5\}$
C) $\{-2, 3, 6\}$ D) $\{2, -1, 0\}$
E) $\{-1, 0, 1\}$

23. $a < 0 < b, b > |a| \Rightarrow$

$\frac{|(a-b)(a+b)| - \sqrt{a^2-2ab+b^2}}{a-b} = ?$

- A) $a-b+1$ B) $1-a-b$ C) $1+a$
D) $-1+a+b$ E) $a+b+1$

Yanıtlar / Answers

1. D	2. B	3. A	4. E	5. C	6. B
7. B	8. E	9. B	10. E	11. D	12. E
13. B	14. B	15. B	16. C	17. E	18. C
19. C	20. D	21. C	22. B	23. B	

1. $|x-5| < |x-3|, x \in \mathbb{Z} \Rightarrow x_{\min} = ?$
 A) 4 B) 5 C) 6 D) 7 E) 10
2. $|4-2x| \leq 8 \Rightarrow x \in ?$
 A) $\{3, 5\}$ B) $(-\infty, 6)$ C) $[-2, +\infty)$
 D) $(-2, 6)$ E) $[-2, 6]$
3. $\left|\frac{4x-3}{5}\right| > 3 \Rightarrow x \in ?$
 A) $\left(\frac{9}{5}, 5\right)$ B) $\left(-3, \frac{9}{2}\right)$ C) $\left(-\infty, \frac{9}{2}\right]$
 D) $(-\infty, -3) \cup \left(\frac{9}{2}, +\infty\right)$ E) $(-\infty, -3] \cup \left[\frac{9}{2}, +\infty\right)$
4. $|2x+1| \leq |2x-3|, x \in \mathbb{Z} \Rightarrow x_{\max} = ?$
 A) 0 B) 1 C) 2 D) 3 E) 4
5. $x \in \mathbb{Z}, 5 < |x-4| < 8 \Rightarrow \sum x = ?$
 A) -5 B) 16 C) 21 D) 25 E) 30
6. $\left|\frac{x+7}{2}\right| \leq 7 \Rightarrow x \in ?$
 A) $(-\infty, 0)$ B) $[-21, 7]$ C) $(-10, 21)$
 D) $[-2, 30]$ E) $(-10, 21]$
7. $|x-2| \leq |x-4| \Rightarrow x \in ?$
 A) $(-\infty, 0]$ B) $(-\infty, -3)$ C) $(-\infty, -3]$
 D) $(-\infty, 3]$ E) $[2, 3]$
8. $x \in \mathbb{Z},$
 $3 < |2x-1| < 7 \Rightarrow \sum x = ?$
 A) -2 B) -1 C) 0 D) 1 E) 2
9. $|2x-2| \leq |x+2| \Rightarrow x \in ?$
 A) $(-2, 0)$ B) $[0, 4]$ C) $[-2, 4]$
 D) $[-2, 0) \cup (2, +\infty)$ E) $[4, +\infty)$
10. $\left. \begin{array}{l} |x+2| < 4 \\ |x-1| > 3 \end{array} \right\} \Rightarrow \sum x = ?$
 A) 6 B) 7 C) -9 D) -12 E) -14
11. $x \cdot |x| \leq 2 \Rightarrow \text{ÇK (SS)} = ?$
 A) $(-\infty, -2)$ B) $(\sqrt{2}, \infty)$ C) $(-\infty, -\sqrt{2})$
 D) $(-\sqrt{2}, \sqrt{2})$ E) $(-\infty, \sqrt{2})$
12. $x \in \mathbb{Z},$
 $4 < |2x-1| \leq 5 \Rightarrow \sum x = ?$
 A) 0 B) 1 C) 2 D) 3 E) 4

13. $|x+1| \leq |x-3| \Rightarrow \text{ÇK (SS)} = ?$

- A) $[0, 1]$ B) $(-\infty, 1]$ C) $(1, +\infty)$
D) $\mathbb{R}$ E) $[-1, 1]$

14. $x \in \mathbb{Z}$,

$2 \leq |x-1| \leq 5 \Rightarrow \sum x = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

15. $\left| \frac{3}{x-2} \right| \geq 1 \Rightarrow \text{ÇK (SS)} = ?$

- A) $[-1, 5] - \{2\}$ B) $(0, 2)$
C) $[2, 3]$ D) $(2, +\infty)$
E) $(-\infty, 3)$

16. $x \in \mathbb{Z}$,

$\sqrt{x^2 - 6x + 9} = 3 - x$, $|x+2| = x+2$,

$\Rightarrow \sum x = ?$

- A) -2 B) 0 C) 1 D) 3 E) 8

17. $|3x-2| < 8 \Rightarrow \text{ÇK (SS)} = ?$

- A) $[-2, 0]$ B) $(-2, \frac{10}{3}]$
C) $[0, 2]$ D) $(-2, \frac{10}{3})$
E) $[-2, \frac{10}{3}]$

18. $|x-2| < 4 \Rightarrow \text{ÇK (SS)} = ?$

- A) $-2 < x < 6$ B) $-2 < x < 0$ C) $2 < x < 6$
D) $-2 < x < 2$ E) $-2 < x < 4$

19. $1 < \frac{|1-x|}{4} < 2 \Rightarrow x \in ?$

- A) $(-, 9)$ B) $(-4, 7)$
C) $(-7, -3) \cup (5, 9)$ D) $(5, 12)$
E) $(7, 3) \cup (5, 9)$

20. $|x^2 - 8| < 8 \Rightarrow x \in ?$

- A) $(-4, 4)$ B) $(-4, 4) - \{0\}$ C) $\mathbb{R}$
D) $(-\infty, 4)$ E) $(-4, +\infty)$

21. $|x^2 - 2| \leq 7 \Rightarrow x \in ?$

- A) $[-4, 0]$ B) $[-3, 3]$ C) $[-2, 4]$
D) $[0, 4]$ E) $[3, 5]$

22. $|x^2 + 3| \leq 7 \Rightarrow x \in ?$

- A) $[-2, 2]$ B) $(-\infty, 2)$ C) $[-2, +\infty)$
D) $\mathbb{R} - [-2, 2]$ E) $\mathbb{R} - [-\sqrt{3}, \sqrt{3}]$

23. $x^2 + 2|x| - 15 < 0 \Rightarrow x \in ?$

- A) $(-5, 3)$ B) $(-3, 5)$ C) $(-3, 3)$
D) $(-3, +\infty)$ E) $(-\infty, -5)$

Yanıtlar / Answers

1. B	2. E	3. D	4. A	5. B	6. B
7. D	8. D	9. B	10. D	11. E	12. B
13. B	14. E	15. A	16. B	17. D	18. A
19. C	20. B	21. B	22. A	23. C	

1. $4^{|x-2|} = 64 \Rightarrow \text{ÇK (SS)} = ?$
 A) $\{-1, 5\}$ B) $\{-1\}$ C) $\{5\}$
 D) $\{-5, 1\}$ E) $\{2\}$
2. $|2x + 4| = 7 \Rightarrow \text{ÇK (SS)} = ?$
 A) $\left\{\frac{11}{2}, \frac{-3}{2}\right\}$ B) $\left\{\frac{3}{2}, \frac{11}{2}\right\}$ C) $\left\{-\frac{11}{2}, \frac{2}{3}\right\}$
 D) $\left\{-\frac{11}{2}, \frac{3}{2}\right\}$ E) $\left\{\frac{5}{2}, 6\right\}$
3. $|2x + 6| = |2x - 2| \Rightarrow x = ?$
 A) 0 B) -1 C) 3 D) 6 E) 24
4. $|x - 2| + |x - 3| = 7 \Rightarrow \text{ÇK (SS)} = ?$
 A) $\{0, 1, 2\}$ B) $\{1, 6\}$ C) $\{-1, 6\}$
 D) $\{-1\}$ E) $\{6\}$
5. $x \in \mathbb{Z}, |2x - 9| \leq 5 \Rightarrow \sum x = ?$
 A) 22 B) 23 C) 25 D) 26 E) 27
6. $a < 0 < b \Rightarrow$
 $|a - b| - |b - 2a| - |a| = ?$
 A) b B) -b C) $2b - a$ D) $2a$ E) $-a$
7. $|x + y + 3| + |x - y - 1| = 0 \Rightarrow |y| = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5
8. $|2x + 1| - |x - 2| = 0 \Rightarrow \sum x = ?$
 A) 0 B) -1 C) 1 D) 2 E) $-\frac{8}{3}$
9. $a < |a| = b,$
 $|a - b| - |a \cdot b| + |a + b| = 0 \Rightarrow a = ?$
 A) -4 B) -2 C) 0 D) 2 E) 4
10. $a < 0 < b \Rightarrow |a| - |b| + |a - b| + |b + 2| = ?$
 A) $-b + 2$ B) $-2a + b + 2$ C) $-b - a - 2$
 D) $a - b - 2$ E) $-2b + 2$
11. $|x^2 - 4x| < x \Rightarrow ? < x < ?$
 A) $0 < x < 3$ B) $2 < x < 3$ C) $3 < x < 5$
 D) $4 < x < 5$ E) $4 < x < 6$
12. $x \in \mathbb{Z}, 4 \leq |x - 2| < 5 \Rightarrow \sum x = ?$
 A) 6 B) 5 C) 4 D) -8 E) -2
13. $a^2 < a$
 $a \cdot c < 0 \Rightarrow |a| - |c - a| + |c| = ?$
 A) $-2c$ B) 0 C) a
 D) $-2c$ E) $2a - 2c$
14. $2 < x < 5 \Rightarrow \frac{|x - 5| - |x - 2|}{|x| - |x + 1|} = ?$
 A) $x + 7$ B) $5 - x$ C) $2x - 7$
 D) $-x + 2$ E) $2x + 7$

15. $0 < x < 3 \Rightarrow |x-3| + \sqrt{x^2-6x+9} - |3-0| = ?$

- A) $3-x$ B) $x-3$ C) $3-2x$
D) $4x-3$ E) 3

16. $x < 0 < y \Rightarrow$

$$\frac{|x-2y| - |y-x| - |y|}{|y| - |x|} = ?$$

- A) $-x$ B) $2y$ C) -2 D) 1 E) 0

17. $x > y, \quad x + y = 0,$

$$\frac{|x^2-2xy| + |y-2x|}{2|x| + |y|} = 4 \Rightarrow (x-y) = ?$$

- A) -1 B) 0 C) 3 D) 6 E) 7

18. $x \in \mathbb{Z}, \quad \frac{|x|+4}{1-|2x-3|} < 0 \Rightarrow \sum x = ?$

- A) -4 B) -3 C) 0 D) 6 E) 8

19. $3^x = 220 \Rightarrow |x-5| + |x-4| = ?$

- A) 0 B) 1 C) 2 D) 9 E) 4

20. $x \in \mathbb{Z}, \quad 2 \leq |x-1| < 6 \Rightarrow \sum x = ?$

- A) 0 B) 2 C) 5 D) 8 E) 12

21. $x \in \mathbb{Z}, \quad \left| \frac{2x}{8} - 2 \right| \leq 7 \Rightarrow \max(x) = ?$

- A) 0 B) 1 C) 4 D) 6 E) 7

22. $a < 0 < b \Rightarrow |a| + |b| - |a-b| = ?$

- A) $-a$ B) $-b$ C) 0 D) a E) b

23. $a < b < 0 \Rightarrow$

$$|a+b| - |b-a| + \sqrt{a^2-2ab+b^2} = ?$$

- A) $2a$ B) $a+b$ C) $b-a$ D) $a-b$ E) $-a-b$

24. $|2x-1| = 5 \Rightarrow \text{ÇK}(\mathbb{S}) = ?$

- A) $\{-3\}$ B) $\{-2\}$ C) $\{3\}$ D) $\{-2, 3\}$ E) $\{-3, 2\}$

25. $|3-2x| + x = 6 \Rightarrow \text{ÇK}(\mathbb{S}) = ?$

- A) $\{-3\}$ B) $\{-1\}$ C) $\{3\}$ D) $\{-3, 3\}$ E) $\{1, 3\}$

26. $|3x-6| + |2+y| + |9+3z| = 0 \Rightarrow x+y+z = ?$

- A) -3 B) -2 C) -1 D) 3 E) 5

27. $\left| \frac{3}{x} - 1 \right| + 3 = 0 \Rightarrow \text{ÇK}(\mathbb{S}) = ?$

- A) $\emptyset$ B) $\{3\}$ C) $\{1, 3\}$
D) $\{-1, 3\}$ E) $\mathbb{R}$

28. $\left| \frac{x-5}{7} \right| > 0 \Rightarrow \text{ÇK}(\mathbb{S}) = ?$

- A) $[5, +\infty)$ B) $(-5, +\infty)$ C) $(-5, 5)$
D) $\mathbb{R}$ E) $\mathbb{R} - \{5\}$

Yanıtlar / Answers

1. A	2. D	3. B	4. C	5. E	6. D
7. B	8. E	9. B	10. B	11. C	12. C
13. B	14. C	15. C	16. E	17. D	18. B
19. B	20. D	21. D	22. C	23. E	24. D
25. D	26. A	27. A	28. E		

1. $x < -2 \Rightarrow |2x| + |x+2| - |-2x| - |-x| = ?$

- A) -2 B) 1 C) x D) 2x E) 5

2. $2(x-1) \leq -1 + 3(x+2) \Rightarrow \text{ÇK(SS)} = ?$

- A) $x \geq 3$ B) $x \geq 1$ C) $x \leq -1$
D) $x \geq -3$ E) $x \geq -7$

3. $\frac{3}{4}(x+8) \geq -\frac{1}{2}(x-4) + x \Rightarrow \text{ÇK(SS)} = ?$

- A) $x \geq -2$ B) $x > -\frac{8}{5}$ C) $x > -1$
D) $x > \frac{1}{2}$ E) $x \geq -16$

4. $\frac{5}{6}(x-12) \geq 1 + \frac{1}{6}(x-6) \Rightarrow \text{ÇK(SS)} = ?$

- A) $[6, +\infty)$ B) $[9, +\infty)$ C) $[15, +\infty)$
D) $(-\infty, 21)$ E) $(-\infty, 18)$

5. $a < 0 < b \Rightarrow |a-b| + |-b| - |-a| = ?$

- A) a B) 2a C) 2b
D) 2a + 2b E) c - b

6. $a < b < 0 \Rightarrow |a+b| + |b-a| + |a-b| = ?$

- A) 2a B) 2b C) b - 3a
D) a - 2b E) 2a + 3b

7. $\frac{x+7}{x} > -\frac{3}{4} \Rightarrow \text{ÇK(SS)} = ?$

- A) $(-\infty, -4)$ B) $(-\infty, -3)$ C) $\mathbb{R} \setminus [-4, -2]$
D) $(-\infty, -1)$ E) $\mathbb{R} \setminus [-4, 0]$

8. $|x - \frac{2}{3}| = \frac{2}{3} - 1 \Rightarrow \text{ÇK(SS)} = ?$

- A) {1} B) {2} C) {3, 6}
D) $\emptyset$ E) {4, 5}

9. $|x| = 3x - 8 \Rightarrow \text{ÇK(SS)} = ?$

- A) {2} B) {4} C) {5}
D) {6} E) {8}

10. $|x+1| = 2x+4 \Rightarrow \text{ÇK(SS)} = ?$

- A) {0} B) $\{-\frac{1}{2}\}$ C) $\{-\frac{5}{3}\}$
D) {-2} E) {-3}

11. $|6-x| = x \Rightarrow \text{ÇK(SS)} = ?$

- A) {1} B) {2} C) {3} D) {4} E) {5}

12. $|2x+3| = 9 \Rightarrow \text{ÇK(SS)} = ?$

- A) {-2, 2} B) {-4, 3} C) {-6, -2}
D) {-6, 3} E) {-7, 5}

13. $\left|\frac{3x}{5} + \frac{x}{2}\right| = 1 \Rightarrow \text{ÇK(SS)} = ?$

- A) $\left\{-\frac{10}{11}, \frac{10}{11}\right\}$ B) $\left\{-\frac{12}{13}, \frac{12}{13}\right\}$ C) $\left\{-\frac{1}{2}, \frac{1}{2}\right\}$
D) $\left\{\frac{3}{5}\right\}$ E) $\left\{\frac{2}{5}\right\}$

14. $|3x - 4| = 6 - x \Rightarrow \sum x = ?$

- A) $\frac{7}{2}$ B) $\frac{5}{2}$ C) $\frac{3}{2}$ D) $\frac{1}{2}$ E) 0

15. $|5x + 2| = |2x + 5| \Rightarrow \sum x = ?$

- A) 9 B) 8 C) 2 D) 1 E) 0

16. $|4x - 6| + x^2 = 0 \Rightarrow \text{ÇK(SS)} = ?$

- A) {1} B) {2} C) {4} D) {6} E) $\emptyset$

17. $x < y < 0, \Rightarrow \sqrt{16x^2} + \sqrt{25y^2} - |4x + y| = ?$

- A) $-2x$ B) $-2x + 2y$ C) $-4y$
D) $-4y + x$ E) $x + y$

18. $a < 0 < b \Rightarrow \frac{\sqrt{a^2} + \sqrt{b^2}}{|a| + |b|} = ?$

- A) -1 B) 1 C) 2 D) 3 E) $a + b$

19. $|x - 1| + |x - 2| = 13 \Rightarrow \sum x = ?$

- A) -3 B) -2 C) 0 D) 2 E) 3

20. $x < 2 \Rightarrow \sqrt{x^2 - 4x + 4} - |2 - x| = ?$

- A) $6x$ B) $-4x$ C) $-\frac{7}{2}$ D) -3 E) 0

21. $x < 0 \Rightarrow |x - |3x|| + |-x| = ?$

- A) x B) $-x$ C) $-2x$ D) $-3x$ E) $-4x$

22. $x < 1 \Rightarrow \sqrt{x^2 - 3x + 3} + \sqrt{x^2 - 2x + 1} = ?$

- A) $2 - x$ B) $x - 2$ C) $| -x |$ D) x E) 2

23. $|3x - 2| < 5 \Rightarrow \text{ÇK(SS)} = ?$

- A) $\left(-1, \frac{7}{3}\right)$ B) $\left[-1, \frac{7}{3}\right]$ C) $(-\infty, -1]$
D) $\left[\frac{7}{3}, +\infty\right)$ E) $\emptyset$

24. $|x + 3| + 2 = 5 \Rightarrow \sum x = ?$

- A) -10 B) -6 C) -3 D) 0 E) 3

Yanıtlar / Answers

1. D	2. E	3. E	4. C	5. C	6. C
7. E	8. D	9. B	10. C	11. C	12. D
13. A	14. C	15. E	16. E	17. C	18. B
19. E	20. E	21. D	22. A	23. A	24. B

Tanım: Nesnelerin iyi tanımlanmış bir listesidir. Kümeyi oluşturan nesnelere kümenin elemanları denir.

Definition: A set is a well defined list of objects. The objects that constitute the set are called the elements of the set.

Bir A kümesinin eleman sayısı $n(A)$ biçiminde gösterilir. The number of elements of a set A is shown by $n(A)$.

Örnek / Example:

$$A = \{x \mid x < 6 \text{ ve (and) } x \in \mathbb{N}\} \Rightarrow n(A) = ?$$

- A) 2 B) 3 C) 4 D) 6 E) 8

Çözüm / Solution:

$$A = \{0, 1, 2, 3, 4, 5\}$$

$$n(A) = 6$$

Yanıt / Answer D

Örnek / Example:

$$A = \{x \mid x < 8 \text{ ve (and) } x \in \mathbb{N}\} \Rightarrow n(A) = ?$$

- A) 2 B) 3 C) 4 D) 6 E) 8

Çözüm / Solution:

$$A = \{0, 1, 2, 3, 4, 5, 6, 7\}$$

$$n(A) = 8$$

Yanıt / Answer E

Örnek / Example:

$$B = \{0, 1, \{1\}, \emptyset, \{1, 0\}\} \Rightarrow n(B) = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

Çözüm / Solution:

$$0 \in B, 1 \in B, \{1\} \in B, \emptyset \in B \text{ ve (and) } \{1, 0\} \in B$$

$$n(B) = 5$$

Yanıt / Answer E

Boş kümenin eleman sayısı 0 dir.
The number of elements of an empty set is equal to zero.



ALT KÜME / THE SUBSET

Bir A kümesinin her elemanı, bir B kümesinin de elemanı ise A'ya B'nin alt kümesi denir. $A \subset B$ biçiminde gösterilir.

If all elements of the set A are also included in the set B, then we say that A is a subset of the set B. It is shown by $A \subset B$.



ALT KÜMENİN ÖZELLİKLERİ

PROPERTIES of a SUBSET

1. $A \subset A$
2. $\emptyset \subset A$
3. $A \subset B$ ve (and) $B \subset C \Rightarrow A \subset C$
4. $A \subset B$ ve (and) $B \subset A \Rightarrow A = B$
5. n elemanlı bir kümenin alt kümelerinin sayısı 2^n dir.
The number of subsets of a set with n elements is equal to 2^n .

Örnek / Example:

$A = \{a, b, c\}$ kümesinin tüm alt kümelerini yazınız.

Write all subsets for $A = \{a, b, c\}$.

Çözüm / Solution:

$$\begin{aligned} A_1 &= \emptyset & A_2 &= \{a\} & A_3 &= \{b\} \\ A_4 &= \{c\} & A_5 &= \{a, b\} & A_6 &= \{a, c\} \\ A_7 &= \{b, c\} & A_8 &= \{a, b, c\} \end{aligned}$$



TÜMLEME / COMPLEMENTARY SET

Üzerinde işlem yapılan tüm kümeleri kapsayan kümeye "evrensel küme" denir. Evrensel küme E veya U ile gösterilir.

$A \in E$ olsun. E kümesinin A kümesinde olmayan elemanlarının oluşturduğu kümeye "A kümesinin tümleyeni" denir. A kümesinin tümleyeni A' ile gösterilir.

A set comprising all sets, on which operations are done, is called the universal set and shown by E or U. Let $A \in E$, the elements that exist in U, but do not exist in A are the elements of the complementary set of A. The complementary set of A is shown by A' .

Örnek / Example:

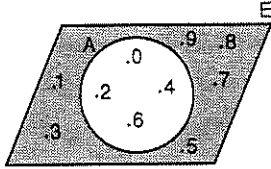
$$E = \{x \mid x < 10 \text{ ve (and) } x \in \mathbb{N}\}, A = \{0, 2, 4, 6\} \Rightarrow A' = ?$$

Çözüm / Solution:

$$E = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$$

$$A = \{0, 2, 4, 6\}$$

$$A' = \{1, 3, 5, 7, 8, 9\}$$



Taralı bölge A' kümesidir.

A' is represented by shaded area.



TÜMLEMENİN ÖZELLİKLERİ

PROPERTIES of COMPLEMENTARY SETS

1. $E' = \emptyset$
2. $\emptyset' = E$
3. $(A')' = A$
4. $A \subset B \Leftrightarrow B' \subset A'$



BİRLEŞİM ve KESİŞİM İŞLEMLERİ

UNION and INTERSECTION OPERATIONS

Birleşim: A ve B kümeleri için ortak elemanları bir kez kullanmak üzere A'nın ve B'nin elemanlarından oluşturduğumuz yeni kümeye A ile B'nin "birleşim kümesi" denir.

$A \cup B$ ile gösterilir.

$$A \cup B = \{x \mid x \in A \text{ veya } x \in B\}$$

Union: The new set composed of all elements of the sets A and B, but by taking the common elements once is called the union set of A and B. It is shown by $A \cup B$.

$$A \cup B = \{x \mid x \in A \text{ or } x \in B\}$$

Örnek / Example:

$$A = \{x \mid x^2 = 16, x \in \mathbb{R}\}$$

$$B = \{x \mid 1 \leq x < 5, x \in \mathbb{Z}\}$$

$$A \cup B = ?$$

Çözüm / Solution:

$$A = \{-4, 4\}$$

$$B = \{1, 2, 3, 4\}$$

$$A \cup B = \{-4, 1, 2, 3, 4\}$$

Kesişim: A ve B kümeleri için bu iki kümenin ortak olan elemanlarının oluşturduğu kümeye A ile B'nin "kesişim kümesi" denir. $A \cap B$ ile gösterilir.

$$A \cap B = \{x \mid x \in A \text{ ve } x \in B\}$$

Intersection: The intersection set of A and B is a set composed of common elements of A and B. It is shown by $A \cap B$.

$$A \cap B = \{x \mid x \in A \text{ and } x \in B\}$$

Örnek / Example:

$$A = \{a, b, c, \{a\}, \{a, b\}\},$$

$$B = \{a, \{a, c\}, \{b\}, \{a, b\}\}$$

$$A \cap B = ?$$

$$A \cup B = ?$$

Çözüm / Solution:

$$A \cup B = \{a, b, c, \{a\}, \{a, b\}, \{a, c\}, \{b\}\}$$

$$A \cap B = \{a, \{a, b\}\}$$

Örnek / Example:

$$A = \{1, 2, 3, 4, 5\},$$

$$B = \{-3, -2, -1\}$$

$$A \cap B = ?$$

$$A \cup B = ?$$

Çözüm / Solution:

$$A \cap B = \emptyset$$

$$A \cup B = \{-3, -2, -1, 1, 2, 3, 4, 5\}$$

Örnek / Example:

$$A = \{a, b, c\},$$

$$B = \{a, b, c, \phi, d\}$$

$$A \cap B = ?$$

$$A \cup B = ?$$

Çözüm / Solution:

$$A \cap B = \{a, b, c\}$$

$$A \cup B = \{a, b, c, \phi, d\}$$



BİRLEŞİM ve KESİŞİMİN ÖZELLİKLERİ PROPERTIES of UNION & INTERSECTION

- $A \cup B = B \cup A$
 $A \cap B = B \cap A$
- $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
 $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
- $A \cup A = A$ ve (and) $A \cap A = A$
- $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
 $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
- $(A \cup B)' = A' \cap B'$ ve (and) $(A \cap B)' = A' \cup B'$
- $A \cup \emptyset = A$ ve (and) $A \cap \emptyset = \emptyset$
- $A \cup E = E$ ve (and) $A \cap E = A$
- $A \cup A' = E$ ve (and) $A \cap A' = \emptyset$
- $n(A \cup B) = n(A) + n(B) - n(A \cap B)$
- $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(A \cap C) - n(B \cap C) + n(A \cap B \cap C)$

Örnek / Example:

$$(A' \cup B)' \cup (A \cup B)' = ?$$

A) A B) B C) A' D) B' E) A ∪ B

Çözüm / Solution:

$$\begin{aligned} (A' \cup B)' \cup (A \cup B)' &= [(A')' \cap B'] \cup [A' \cap B'] \\ &= (A \cap B') \cup (A' \cap B') \\ &= (A \cup A') \cap B' \\ &= E \cap B' \\ &= B' \end{aligned}$$

Yanıt / Answer D



FARK İŞLEMİ / SET SUBTRACTION

A ve B kümeleri için A'nın elemanı olup B'nin elemanı olmayan elemanların oluşturduğu kümeye "A fark B" denir. $A - B$ ya da $A \setminus B$ biçiminde gösterilir.

$$A - B = A \setminus B = \{x \mid x \in A \text{ ve } x \notin B\}$$

For the sets A and B, a set composed of elements that exist in A but, do not exist in B is called A minus B. It is shown by $A - B$ or $A \setminus B$.

$$A - B = A \setminus B = \{x \mid x \in A \text{ and } x \notin B\}$$

Örnek / Example:

$$A = \{a, b, c, d, e\},$$

$$B = \{b, d, f, g\}$$

$$A - B = ?$$

$$B - A = ?$$

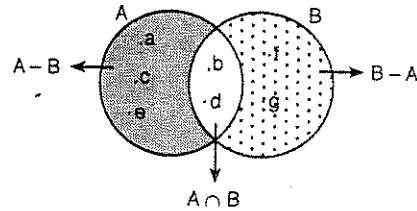
$$A \cap B = ?$$

Çözüm / Solution:

$$A - B = \{a, c, e\}$$

$$B - A = \{f, g\}$$

$$A \cap B = \{b, d\}$$



Örnek / Example:

$$A = \{1, 2, 3, 4\}$$

$$B = \{5, 6\}$$

$$A - B = ?$$

$$B - A = ?$$

Çözüm / Solution:

$$A - B = \{1, 2, 3, 4\} = A$$

$$B - A = \{5, 6\} = B$$

Örnek / Example:

$$A = \{a, b, c, d, e\}$$

$$B = \{b, e\}$$

$$A - B = ?$$

$$B - A = ?$$

Çözüm / Solution:

$$A - B = \{a, c, d\}$$

$$B - A = \emptyset$$



FARK İŞLEMİNİN ÖZELLİKLERİ

PROPERTIES of SET SUBTRACTION

1. $A - B = A \cap B'$
2. $A \subset B \Rightarrow A - B = \emptyset$
3. $A - B = A - (A \cap B)$
4. $E - A = A'$
5. $A - \emptyset = A$
6. $(A - B)' = (A \cap B')' = A' \cup B$
7. $(A - B) \cup B = A \cup B$

Örnek / Example:

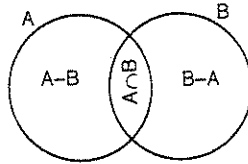
Aşağıdakilerden kaç tanesi doğrudur?

How many choices are true?

1. $(A - B) \subset B$
 2. $A \cap B = \emptyset \Rightarrow A - B = A$
 3. $n(A \cup B) = n(B) \Rightarrow A - B = \emptyset$
 4. $n(A \cup B) = n(B) \Rightarrow n(A) > n(B)$
 5. $(A - B) \cup (A \cap B) = A$
- A) 1 B) 2 C) 3 D) 4 E) 5

Çözüm / Solution:

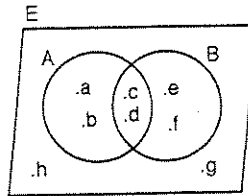
1. $(A - B) \not\subset B$ Yanlış / False.
2. $A - B = A$ Doğru / True.
3. $n(A \cup B) = n(B) \Rightarrow A \subset B$
 $A \subset B \Rightarrow A - B = \emptyset$
 Doğru (True)
4. $n(A \cup B) = n(B) \Rightarrow A \subset B$ Yanlış / False.
5. $(A - B) \cup (A \cap B) = A$ Doğru / True.



Yanıt / Answer C

Örnek / Example:

$$n((A' - B) \cap (A \cup B')) = ?$$



- A) 0 B) 1 C) 2 D) 3 E) 4

Çözüm / Solution:

- * $A = \{a, b, c, d\}$, $B = \{c, d, e, f\}$
 $A' = \{e, f, g, h\}$, $B' = \{a, b, h, g\}$
 $A' - B = \{g, h\}$
 $A \cup B' = \{a, b, c, d, h, g\}$
 $(A' - B) \cap (A \cup B') = \{g, h\}$

Yanıt / Answer C

ÇÖZÜMLÜ TEST / TEST WITH SOLUTIONS

$$1. A = \{a, b, c, d, e\}, B = \{b, c, e, f\} \Rightarrow A \cup B = ?$$

- A) $\{a, b, c, d, e\}$ B) $\{b, c, e, f\}$
 C) $\{b, c, e\}$ D) $\{a, b, c, d, e, f\}$
 E) $\{a, d\}$

Çözüm / Solution:

$$A \cup B' = \{x \mid x \in A \text{ veya (or) } x \in B\}$$

$$A \cup B = \{a, b, c, d, e, f\}$$

Yanıt / Answer D

$$2. A = \{1, 3, 5\}, B = \{x \mid 0 \leq x \leq 7, x \in \mathbb{Z}\}$$

$$\Rightarrow n(A \cup B) = ?$$

- A) 8 B) 9 C) 10 D) 11 E) 12

Çözüm / Solution:

$$A = \{1, 3, 5\}, B = \{0, 1, 2, 3, 4, 5, 6, 7\}$$

$$A \cup B = \{0, 1, 2, 3, 4, 5, 6, 7\}$$

$$n(A \cup B) = 8$$

Yanıt / Answer A

$$3. A = \{0, -1, 1, 2\}, B = \{x \mid 1 \leq x < 10, x \in \mathbb{Z}\}$$

$$\Rightarrow A \cap B = ?$$

- A) $\{0, 1, 2\}$ B) $\{1, 2\}$
 C) $\{1, 2, 3\}$ D) $\{-1, 0, 1\}$
 E) $\{1, 2, 3, 4, 5\}$

Çözüm / Solution:

$$A \cap B = \{x \mid x \in A \text{ ve (and) } x \in B\}$$

$$A = \{0, -1, 1, 2\}, B = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$$

$$A \cap B = \{1, 2\}$$

Yanıt / Answer B

4. $A = \{x; -3 \leq x < 4, x \in \mathbb{Z}\}$
 $B = \{x; |x-3| < 3, x \in \mathbb{Z}\}$
 $\Rightarrow n(A \cap B) = ?$
 A) 3 B) 4 C) 5 D) 6 E) 7

Çözüm / Solution:

$$A = \{-3, -2, -1, 0, 1, 2, 3\}$$

$$|x-3| < 3 \Rightarrow -3 < x-3 < 3$$

$$0 < x < 6$$

$$B = \{1, 2, 3, 4, 5\}$$

$$A \cap B = \{1, 2, 3\} \Rightarrow n(A \cap B) = 3$$

Yanıt / Answer A

5. $A \cap B = \emptyset$
 $n(A) = 5, n(B) = 3 \Rightarrow n(A \cup B) = ?$
 A) 5 B) 6 C) 7 D) 8 E) 9

Çözüm / Solution:

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

$$= 5 + 3 - 0$$

$$= 8$$

Yanıt / Answer D

6. $A = \{1, 2, 3, 4, 5\}, B = \{3, 5, 7, 9, 11\}$
 $\Rightarrow B - A = ?$
 A) $\{1, 2, 4\}$ B) $\{1, 2, 3, 4, 5\}$
 C) $\{7, 9, 11\}$ D) $\{3, 5, 7, 9, 11\}$
 E) $\{3, 5\}$

Çözüm / Solution:

$$B - A = \{x | x \in B \text{ ve (and) } x \notin A\}$$

$$B - A = \{7, 9, 11\}$$

Yanıt / Answer C

7. $A = \{x | x \in \mathbb{Z}, x^2 \leq 4\}$
 $B = \{x | x \in \mathbb{Z}, |x| \leq 1\} \Rightarrow B - A = ?$
 A) A B) B C) $\{-1, -1, 1, 2\}$
 D) $\emptyset$ E) $\{-1, 0, 1\}$

Çözüm / Solution:

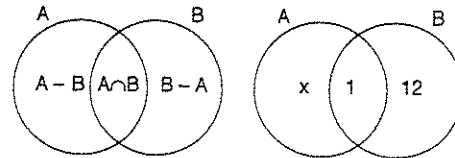
$$A = \{-2, -1, 0, 1, 2\}$$

$$B = \{-1, 0, 1\} \Rightarrow B - A = \emptyset$$

Yanıt / Answer D

8. $n(A \cap B) = 1, n(B - A) = 12$ ve (and) $n(A \cup B) = 16$
 $\Rightarrow n(A) = ?$
 A) 8 B) 7 C) 6 D) 5 E) 4

Çözüm / Solution:



$$x + 1 + 12 = 16$$

$$x = 3$$

$$n(A) = 3 + 1$$

$$= 4$$

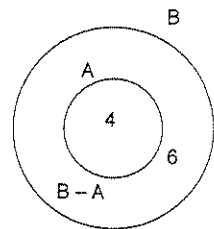
Yanıt / Answer E

9. $A \cap B = A, n(A) = 4, n(B - A) = 6 \Rightarrow n(B) = ?$
 A) 2 B) 4 C) 6 D) 8 E) 10

Çözüm / Solution:

$$A \cap B = A \Rightarrow A \subset B$$

$$n(B) = 4 + 6 = 10$$

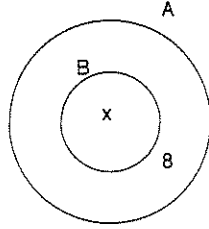


Yanıt / Answer E

10. $B \subset A$, $n(A) = 12$, $n(A - B) = 8 \Rightarrow n(B) = ?$
 A) 3 B) 4 C) 5 D) 6 E) 7

Çözüm / Solution:

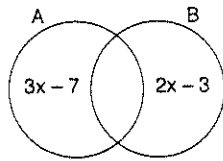
$$\begin{aligned} n(A) &= 12 \\ x + 8 &= 12 \\ x &= 4 \\ n(B) &= 4 \end{aligned}$$



Yanıt - Answer B

11. $n(A - B) = 3x - 7$,
 $n(B - A) = 2x - 3$
 $n(A - B) = n(B - A)$
 $n(A \cup B) = 14 \Rightarrow$
 $n(A \cap B) = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6



Çözüm / Solution:

$$\begin{aligned} n(A - B) &= n(B - A) \Rightarrow 3x - 7 = 2x - 3 \\ x &= 4 \end{aligned}$$

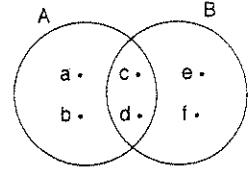
$$\begin{aligned} n(A - B) &= 5, n(B - A) = 5 \\ n(A \cup B) &= n(A - B) + n(B - A) + n(A \cap B) \\ 14 &= 5 + 5 + n(A \cap B) \\ n(A \cap B) &= 4 \end{aligned}$$

Yanıt / Answer C

12. $A = \{a, b, c, d\}$,
 $A \cup B = \{a, b, c, d, e, f\}$
 $A - B = \{a, b\}$
 $\Rightarrow B - (A \cap B) = ?$
 A) $\{c, d\}$ B) $\{e, f\}$ C) $\{c, d, e, f\}$
 D) $\{a, b\}$ E) $\emptyset$

Çözüm / Solution:

$$\begin{aligned} A \cap B &= \{c, d\} \\ B &= \{c, d, e, f\} \\ B - (A \cap B) &= \{e, f\} \end{aligned}$$



Yanıt / Answer B

13. $n(A \cup B) = 20$,
 $n(A - B) = 8$,
 $n(B - A) = 10$
 $\Rightarrow n(A \cap B) = ?$
 A) 1 B) 2 C) 3 D) 7 E) 15

Çözüm / Solution:

$$\begin{aligned} n(A \cup B) &= n(A - B) + n(B - A) + n(A \cap B) \\ 20 &= 8 + 10 + n(A \cap B) \\ n(A \cap B) &= 2 \end{aligned}$$

Yanıt - Answer B

14. $3 \cdot n(A) = 4 \cdot n(B)$,

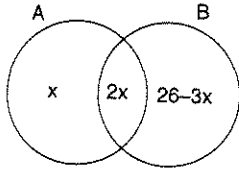
$$\frac{n(A \cap B)}{n(A - B)} = 2 \text{ ve (and)}$$

$$n(A \cup B) = 26$$

$$\Rightarrow n(B) = ?$$

- A) 4 B) 8 C) 10 D) 12 E) 18

Çözüm / Solution:



$$n(A - B) = x$$

$$\Rightarrow n(A \cap B) = 2x$$

$$n(A \cup B) = n(A - B) + n(B - A) + n(A \cap B)$$

$$26 = x + 2x + n(B - A)$$

$$n(B - A) = 26 - 3x$$

$$3 \cdot n(A) = 4 \cdot n(B)$$

$$3(3x) = 4(26 - x)$$

$$9x = 104 - 4x$$

$$13x = 104$$

$$x = 8$$

$$n(B) = 26 - x = 26 - 8$$

$$= 18$$

Yanıt / Answer E

15. $n(A) = 7$, $n(A \cap B) = 4$

$$3 \cdot n(A - B) = n(B) \Rightarrow n(B - A) = ?$$

- A) 2 B) 3 C) 4 D) 5 E) 6

Çözüm / Solution:

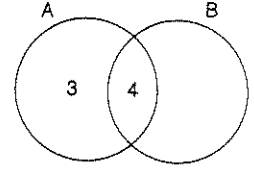
$$n(B) = 3 \cdot n(A - B)$$

$$= 3 \cdot 3$$

$$= 9$$

$$n(B - A) = 9 - 4$$

$$= 5$$



Yanıt / Answer D

16. $(-3, 5] \cup [2, 7) = ?$

A) $(-3, 7)$

B) $[-3, -7)$

C) $(-3, 7]$

D) $[-3, 7)$

E) $(2, 5)$

Çözüm / Solution:

$$(-3, 5] = \{x \mid -3 < x \leq 5, x \in \mathbb{R}\}$$

$$[2, 7) = \{x \mid 2 \leq x < 7, x \in \mathbb{R}\}$$

$$(-3, 5] \cup [2, 7) = \{x \mid -3 < x < 7, x \in \mathbb{R}\}$$

$$= (-3, 7)$$

Yanıt / Answer A

17. $[-2, 6] \cap [0, 3) = ?$

A) $[-2, 6]$

B) $[0, 3)$

C) $[-2, 0]$

D) $[3, 6]$

E) $(3, 6)$

Çözüm / Solution:

$$[-2, 6] = \{x \mid -2 \leq x \leq 6, x \in \mathbb{R}\}$$

$$[0, 3) = \{x \mid 0 \leq x < 3, x \in \mathbb{R}\}$$

$$[-2, 6] \cap [0, 3) = \{x \mid 0 \leq x < 3, x \in \mathbb{R}\}$$

$$= [0, 3)$$

Yanıt / Answer B

18. $A = \{a, b, c\}$,

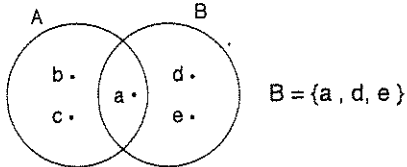
$A \cup B = \{a, b, c, d, e\}$

$A - B = \{b, c\}$

$\Rightarrow B = ?$

- A) $\{a, c, e\}$ B) $\{d, e\}$ C) $\{a, d, e\}$
D) $\{a, b, d, e\}$ E) $\{b, d, e\}$

Çözüm / Solution:



Yanıt / Answer C

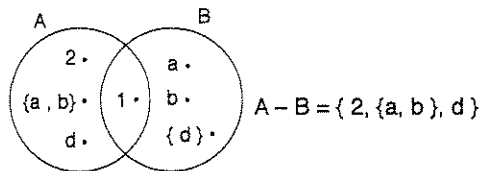
19. $A = \{1, 2, \{a, b\}, d\}$

$B = \{1, a, b, \{d\}\}$

$\Rightarrow A - B = ?$

- A) $\{a, b\}$ B) $\{a, b, \{d\}\}$ C) $\{a, b, d\}$
D) $\{2\}$ E) $\{2, \{a, b\}, d\}$

Çözüm / Solution:



Yanıt / Answer E

YÖS SORULARI / YÖS QUESTIONS

1. $P = \{a, b, c, d\}$, $Q = \{d, c, b\}$, $R = \{a, b\}$

$\Rightarrow (P \cap R) \cup Q = ?$

- A) $P - Q$ B) $P - R$ C) P D) Q E) R

(YÖS 1984)

Çözüm / Solution:

$P \cap R = \{a, b\}$, $(P \cap R) \cup Q = \{a, b\} \cup \{d, c, b\}$
 $= \{a, b, c, d\} = P$

Yanıt / Answer C

2. $(-1, 2] \cup [1, 5) = ?$

- A) $(-1, 5)$ B) $(-1, 5]$ C) $[-1, 5]$
D) $[-1, 5)$ E) $(-1, 1]$

(YÖS 1984)

Çözüm / Solution:

$(-1, 2] \cup [1, 5) = (-1, 5)$

Yanıt / Answer A

3. $A = \{0, 1, 2, 3, 4\}$, $B = \{0, 2, 4, 6, 8\}$

$C = \{1, 5, 6, 7\} \Rightarrow n(A \cup B \cup C) = ?$

- A) 5 B) 7 C) 9 D) 12 E) 14

(YÖS 1985)

Çözüm / Solution:

$A \cup B \cup C = \{0, 1, 2, 3, 4, 5, 6, 7, 8\}$
 $n(A \cup B \cup C) = 9$

Yanıt / Answer C

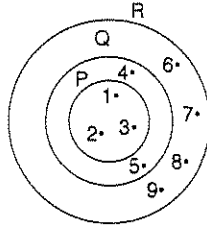
4. $P \subset Q \subset R$, $n(P) = 3$, $n(Q) = 5$, $n(R) = 9$
 $\Rightarrow n(P \cup Q) + n(P \cap R) = ?$

A) 12 B) 9 C) 8 D) 5 E) 3

(YÖS 1986)

Çözüm / Solution:

$$\begin{aligned} n(P \cup Q) &= n(Q) \\ &= 5 \\ n(P \cap R) &= n(P) \\ &= 3 \\ n(P \cup Q) + n(P \cap R) &= 5 + 3 = 8 \end{aligned}$$



Yanıt / Answer C

5. $(1, 5] \cup [-3, 4) = ?$

A) $(1, 4]$ B) $(-3, 5]$ C) $[1, 4]$
D) $[-3, 4]$ E) $[-3, 5]$

(YÖS 1986)

Çözüm / Solution:

$$(1, 5] \cup [-3, 4) = [-3, 5]$$

Yanıt / Answer E

6. $P = \{2, 4, 6, 8, 10\}$, $Q = \{x \mid 1 < x < 10, x \in \mathbb{Z}\}$
 $\Rightarrow n(P \cap Q) = ?$

A) 8 B) 7 C) 6 D) 5 E) 4

(YÖS 1986)

Çözüm / Solution:

$$\begin{aligned} P &= \{2, 4, 6, 8, 10\}, Q = \{2, 3, 4, 5, 6, 7, 8, 9\} \\ P \cap Q &= \{2, 4, 6, 8\} \Rightarrow n(P \cap Q) = 4 \end{aligned}$$

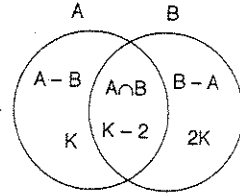
Yanıt / Answer E

7. $n(A \cap B) = K - 2$, $n(A - (A \cap B)) = K$,
 $n(B - (A \cap B)) = 2K$, $n(A \cup B) = 54 \Rightarrow n(A) = ?$
A) 25 B) 26 C) 27 D) 28 E) 29

(YÖS 1987)

Çözüm / Solution:

$$\begin{aligned} K + K - 2 + 2K &= 54 \\ 4K &= 56 \\ K &= 14 \\ n(A) &= K + K - 2 \\ &= 2K - 2 \\ &= 2 \cdot 14 - 2 \\ &= 26 \end{aligned}$$



Yanıt / Answer B

8. $A = \{x \mid 0 < x \leq 10, x \in \mathbb{Z}^+\}$
 $B = \{y \mid y = 2 \cdot K, 0 < K \leq 10, K \in \mathbb{Z}^+\}$
 $\Rightarrow n(A \cap B) = ?$

A) 4 B) 5 C) 6 D) 7 E) 8

(YÖS 1988)

Çözüm / Solution:

$$\begin{aligned} A &= \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\} \\ B &= \{2, 4, 6, 8, 10, 12, 14, 16, 18, 20\} \\ A \cap B &= \{2, 4, 6, 8, 10\} \\ n(A \cap B) &= 5 \end{aligned}$$

Yanıt / Answer B

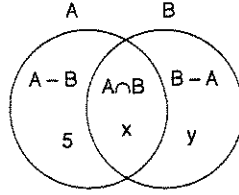
9. $n(A \cup B) = 18$, $n(A - B) = 5$, $n(A) = n(B)$
 $\Rightarrow n(A \cap B) = ?$

A) 5 B) 6 C) 7 D) 8 E) 9

(YÖS 1984)

Çözüm / Solution:

$$\begin{aligned}
 x + y + 5 &= 18 \\
 x + y &= 13 \\
 n(A) &= n(B) \\
 \Rightarrow 5 + x &= x + y \\
 5 &= y \\
 x + y &= 13 \\
 5 + x &= 13 \\
 x &= 8
 \end{aligned}$$



Yanıt / Answer D

10. $A = \{x \mid x \in \mathbb{Z}, 1 \leq x \leq 50\}$

$B = \{y \mid y \in \mathbb{Z}, 1 \leq y^2 \leq 50\}$

$n(A - B) = ?$

- A) 0 B) 25 C) 43 D) 47 E) 50

(YÖS 1989)

Çözüm / Solution:

$A = \{1, 2, 3, 4, 5, 6, \dots, 48, 49, 50\}$

$B = \{-7, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7\}$

$A - B = \{8, 9, 10, \dots, 50\}$

$n(A - B) = 50 - 7 = 43$

Yanıt / Answer C

11. $n(A \cup B) = 17$

$n(A) = 8$

$n(A - B) = 5$

$n(B) = ?$

- A) 6 B) 7 C) 9 D) 12 E) 13

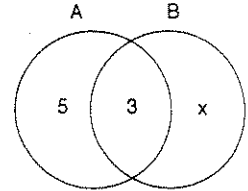
(YÖS 1997)

Çözüm / Solution:

$5 + 3 + x = 17$

$x = 9$

$n(B) = 3 + 9$
 $= 12$



Yanıt / Answer D

12. $A = \{x \mid 5 < x \leq 100, x = 2n, n \in \mathbb{N}\}$

$B = \{y \mid 16 < y \leq 120, y = 3k, k \in \mathbb{N}\}$

$s(A \cap B) = ?$

- A) 10 B) 11 C) 12 D) 13 E) 14

(YÖS 2005)

Çözüm / Solution:

$A \cap B = \{x \mid 16 < x \leq 100, x = 6n, n \in \mathbb{N}\}$

$A \cap B = \{18, 24, 30, \dots, 96\}$

$\Rightarrow s(A \cap B) = \frac{96 - 18}{6} + 1 = 14$

Yanıt / Answer E

1. $A = \{1, 3, a, \{a\}, \{a, b\}, c\}$
 $B = \{1, \{a\}, \{b\}, \{c\}\} \Rightarrow n(A - B) = ?$

Yanıt / Answer : 4

2. $A = \{1, 2, 3\}, A \cup B = \{0, 1, 2, 3, 4, 5, 6\}$
 $A - B = \{2, 3\} \Rightarrow B = ?$

Yanıt / Answer : $\{0, 1, 4, 5, 6\}$

3. $P, Q \subset E$
 $n(P) = 12, n(P') = 14$ ve (and) $n(Q) = 6$
 $\Rightarrow n(Q') = ?$

Yanıt / Answer : 20

4. $n(A - B) = 8, n(B) = 12, \Rightarrow n(A \cup B) = ?$

Yanıt / Answer : 20

5. $n(A) + n(A') = 30,$
 $n(B) = 13 \Rightarrow n(B') = ?$

Yanıt / Answer : 17

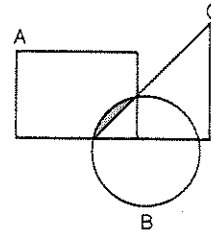
6. $n(A) = n(B - A),$
 $2 \cdot n(A - B) = n(A \cap B),$
 $n(A \cup B) = 18 \Rightarrow n(A) = ?$

Yanıt / Answer : 9

7. $A \subset E, B \subset E,$
 $n(A \cup B) + n(A \cap B) = 13,$
 $n(A') = 10,$
 $n(B') = 15 \Rightarrow n(A) = ?$

Yanıt / Answer : 9

8. Taralı Alan = ?
The shaded area = ?

Yanıt / Answer : $(A \cap B) \cap (A' \cup B' \cup C')$

9. $n(A) = 9,$
 $n(B) = 4 \cdot n(A) + 2,$
 $n(A \cup B) = 40$
 $\Rightarrow n(A \cap B) = ?$

Yanıt / Answer : 7

10. $n(A - B) = 2 \cdot n(B - A)$
 $n(A \cap B) = 3$
 $n(A \cup B) = 15$
 $\Rightarrow n(A) = ?$

Yanıt / Answer : 11

11. $A = \{ (x, y) \mid x + y \leq 6, x, y \in \mathbb{N} \} \Rightarrow n(A) = ?$

Yanıt / Answer : 28

12. $n(A \cup B) = 20,$
 $n(A \cap B) = 1,$
 $n(B \setminus A) = 16$
 $\Rightarrow n(A) = ?$

Yanıt / Answer : 4

13. $E = \{x : 50 \leq x \leq 300, x \in \mathbb{N}\}$
 $A = \{x \in E : x = 4k, k \in \mathbb{Z}\}$
 $B = \{x \in E : x = 3k, k \in \mathbb{Z}\}$
 $\Rightarrow n(A \cup B) = ?$

Yanıt / Answer : 123

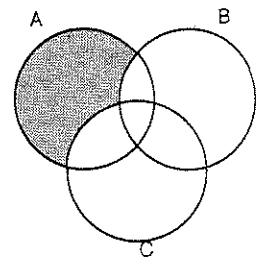
14. $A \setminus (A \cap B)' = ?$

Yanıt / Answer : $A \cap B$

15. $n(A) = 15, n(B) = 13,$
 $n(A \cup B) = 22 \Rightarrow n(A \cap B) = ?$

Yanıt / Answer : 6

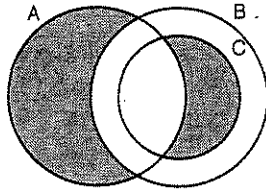
16. Taralı Alan = ?
The shaded area = ?



Yanıt / Answer : $(A - B) - C$

1. Taralı Alan = ?

The shaded Area = ?



A) $(A/B) \cup (B/C)$

B) $(A/B) \cup (C/B)$

C) $(A/B) \cup (C/A)$

D) $(A \cup B \cup C) \setminus (A \cap B)$

E) $A \cap B \cup C \cap (A \cap B)$

2. $a \in \mathbb{Z}$

$n(A \cap B) = a,$

$n(A) = 2a + 2,$

$n(B) = 4 - a$

$\Rightarrow n(A \cup B) = ?$

A) 4

B) 6

C) 9

D) 12

E) 16

3. $[(A \cap B) \cup (A \cap C) \cup (B \cap C)]' \cap (A \cap B \cap C) = ?$

A) $A \cap B \cap C$

B) $A \cup B \cup C$

C) $\emptyset$

D) E

E) $A \cap B$

4. $A = \{a, b, c, d\},$

$A \cup B = \{a, b, c, d, e\}$

$A/B = \{a, b\}$

B = ?

A) $\{e\}$

B) $\{c, d\}$

C) $\{c, d, e\}$

D) $\{b, d, e\}$

E) $\{a, e\}$

5. $[(A/B) \cup (A \cap B)]' = ?$

A) $\emptyset$

B) E

C) A

D) A'

E) E'

6. $n(A \cup B) = 3 \cdot n(A \cap B),$

$n(A \cup B) = 15,$

$n(A - B) = 3$

$\Rightarrow n(B - A) = ?$

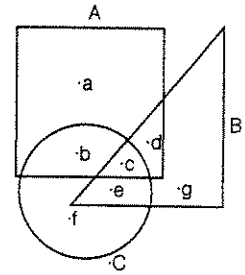
A) 4

B) 5

C) 7

D) 9

E) 11

7. $[(A \cup C) \setminus B] \cap A = ?$ 

A) $\{a\}$

B) $\{d, c\}$

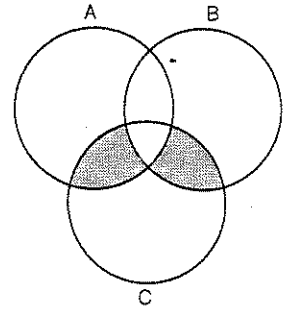
C) $\{a, b\}$

D) $\{e, f\}$

E) $b\}$

8. Taralı Alan = ?

The shaded Area = ?



A) $C \cap (A' \cup B') \cup (A \cap B)$

B) $[C \cap (A \cup B)] \setminus (A \cap B \cap C)$

C) $[(A \cap B)' \cap C] \setminus (A \cup B)$

D) $(A \cup B) \setminus C$

E) $(A \cup B \cup C) \setminus [A \cap (B \cup C)]$

9. $n(A) = 6,$

$n(B) = 12$

$\Rightarrow \max(A \cup B) + \min(A \cup B) = ?$

A) 32

B) 31

C) 30

D) 29

E) 28

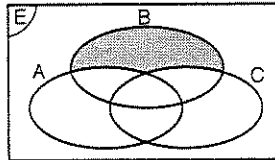
10. $A = \{x \mid 200 < x < 400; x = 4n, n \in \mathbb{N}\} \Rightarrow n(A) = ?$
 A) 48 B) 49 C) 50 D) 51 E) 52

11. $A = \{x \mid |x - 2| < 8; x \in \mathbb{Z}\}$
 $B = \{x \mid |2 - x| < 4; x \in \mathbb{Z}\}$
 $\Rightarrow n(A \setminus B) = ?$
 A) 9 B) 8 C) 7 D) 6 E) 5

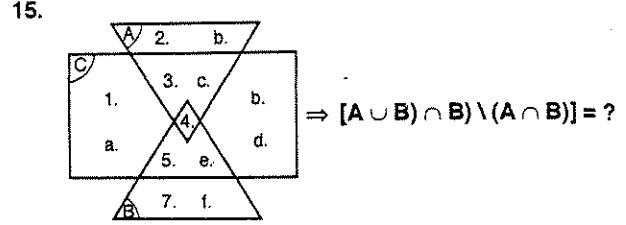
12. $A, B \subset E$
 $A \subset B \Rightarrow (A \cup B) \cap (B \cup E)' = ?$
 A) A B) B C) $A \cup B$ D) $\emptyset$ E) E

13. $\frac{n(A \cup B)}{n(A \cap B)} = 4,$
 $n(B \setminus A) = 12,$
 $n(A \setminus B) = 9$
 $\Rightarrow n(A \cup B) = ?$
 A) 25 B) 28 C) 30 D) 35 E) 40

14. Taralı Alan = ?
 The shaded Area = ?



- A) $B \setminus (A \cup C)$ B) $[E \setminus (A \cap C)]'$
 C) $B \setminus (A \cap C)'$ D) $(A \cup C) \setminus B$
 E) $[E \setminus (A \cap C)]$



- A) {5e7f} B) {7e5f} C) {4b5e}
 D) {2a3c} E) {7c5d}

16. $A = \{1, 2, 3\},$
 $A \cap B = \{1, 3\},$
 $A \cup B = \{1, 2, 3, 4, 5, 6\}$
 $\Rightarrow B = ?$
 A) {1, 2, 3} B) {4, 5, 6} C) {1, 3}
 D) {1, 3, 4, 5, 6} E) {2, 4, 5, 6}

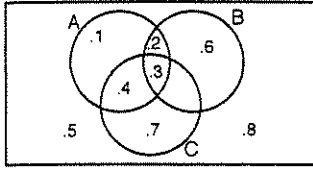
17. $n(A) = 8,$
 $n(B) = 6,$
 $n(A \cap B) \neq 0$
 $\Rightarrow \max(n(A - B) + \min(n(A - B))) = ?$
 A) 1 B) 3 C) 5 D) 9 E) 12

18. $A = \{x \mid 25 \leq x \leq 452, x = 3k, k \in \mathbb{Z}^+\}$
 $B = \{y \mid 5 \leq y \leq 299, y = 2k, k \in \mathbb{Z}^+\}$
 $\Rightarrow n(A \cup B) = ?$
 A) 198 B) 216 C) 244 D) 260 E) 316

Yanıtlar / Answers

1. C	2. B	3. C	4. C	5. D	6. C
7. C	8. B	9. C	10. B	11. B	12. D
13. B	14. A	15. A	16. D	17. D	18. C

1.

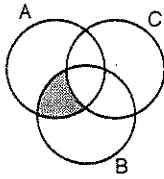


$(B - C) \cap A$ kümesi, aşağıdakilerden hangisidir?

Which one of the followings is the set $(B - C) \cap A$?

- A) {1, 2} B) {2} C) {6, 4, 3}
D) {5, 8} E) {7, 4, 3}

2.



Taralı bölge, aşağıdakilerden hangisi ile gösterilir?

Which one of the following shows the shaded area?

- A) $(A \cap B) \cap C$ B) $(A \cap B) \setminus C$
C) $A \cap (B \cap C)$ D) $(A \setminus B) \cup C$
E) $(C \cup B) \setminus A$

3. $[(B \cap A)' \cap (B' \cup A)]' = ?$

- A) B B) $A \cap B$ C) $A \cup B$ D) $A \setminus B$ E) A

4. $n(A - B) = 2 \cdot n(B - A) = \frac{1}{5} \cdot n(A \cap B)$

$$n(A \cup B) = 39 \Rightarrow n(B) = ?$$

- A) 6 B) 9 C) 30 D) 33 E) 36

5. $A, B \neq \emptyset$

$$n(A \setminus B) = x + 3$$

$$n(A \cap B) = 2$$

$$n(B \setminus A) = 4x$$

$$n(A \cup B) = 60$$

$$\Rightarrow n(A) = ?$$

- A) 5 B) 10 C) 16 D) 21 E) 44

6. $n(A - B) = 4$

$$n(B - A) = 5$$

$$n(A) = 6 \Rightarrow n(A \cup B) = ?$$

- A) 4 B) 9 C) 10 D) 11 E) 15

7. $n(A) = 12$

$$n(B - A) = 4 \Rightarrow n(A \cup B) = ?$$

- A) 8 B) 10 C) 12 D) 16 E) 20

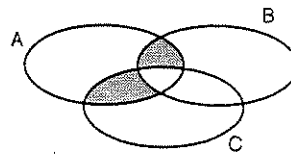
8. $n(A \cup B) = 10$

$$n(A \cap B) = 2, \quad n(A') = 6$$

$$n(B') = 4 \Rightarrow n(A \cup B') = ?$$

- A) 5 B) 6 C) 7 D) 8 E) 14

9.



Taralı bölge, aşağıdakilerden hangisi ile gösterilir?

Which one of the following shows the shaded area?

- A) $B \cap A \cap C$ B) $B \cap (A \setminus C)$
C) $[A \cap (B \cup C)] \setminus (B \cap C)$ D) $B \setminus (A \cup C)$
E) $A \cap (C \setminus B)$

10. $A = \{a, c, \emptyset, \{a, b\}\}$ ise aşağıdakilerden hangisi yanlıştır?

Which one is wrong?

- A) $a \in A$ B) $\{a, b\} \subset A$ C) $\emptyset \subset A$
D) $\{c\} \subset A$ E) $\emptyset \in A$

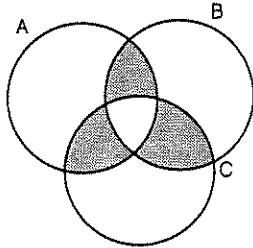
11. $A, B \neq \emptyset, A, B \subset E$

$$n(A \cap B)' = 55, n(A \cup B)' = 12$$

$$n(A) + n(B) = 45 \Rightarrow n(E) = ?$$

- A) 12 B) 43 C) 47 D) 56 E) 62

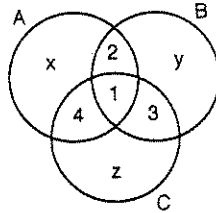
12. $n(A) = 16, n(B) = 12,$
 $n(C) = 17,$
 $n(A \cap B \cap C) = 4,$
 $n(A \cup B \cup C) = 30$ ise
 taralı bölgede toplam
 kaç eleman vardır?



How many elements are there in all shaded areas?

- A) 7 B) 19 C) 21 D) 33 E) 49

13. $2n(A) = n(B)$
 $n(A) = n(C) + 2$
 $n(A \cup B \cup C) = 27$
 $\Rightarrow n(A) = ?$

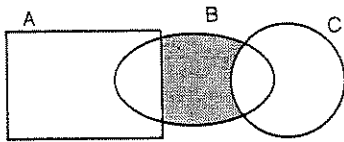


- A) 7 B) 10 C) 12 D) 14 E) 25

14. $n(A \cup B) = 20$
 $n(A \setminus B) = 6$
 $n(B \setminus A) = 7 \Rightarrow n(A \cap B) = ?$

- A) 6 B) 7 C) 11 D) 12 E) 20

15.



Taralı bölge, aşağıdakilerden hangisi ile gösterilir?

Which of the following shows the shaded area?

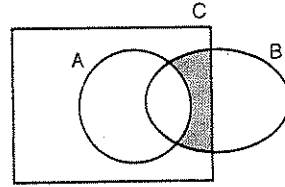
- A) $A \cap (B \setminus C)$ B) $A \cup (B \cap C)$
 C) $B \setminus (A \cup C)$ D) $(B \cap C) \setminus A$
 E) $(A \cap B) \cup C$

$$16. \frac{1}{3} \cdot n(A \setminus B) = 3 \cdot n(B \setminus A) = \frac{1}{5} \cdot n(A \cap B)$$

$$n(A \cup B) = 50 \Rightarrow n(A \cap B) = ?$$

- A) 12 B) 18 C) 21 D) 30 E) 32

17.



Taralı bölge, aşağıdakilerden hangisi ile gösterilir?

Which of the following shows the shaded area?

- A) $A \cap B \cap C$ B) $(A \cap B) \setminus C$ C) $(A \cup B \cup C) \setminus C$
 D) $(A \cap C) \setminus B$ E) $(B \cap C) \setminus A$

18. $A \subset B, n(B \setminus A) = 9, n(A \cup B) = 12$
 $\Rightarrow n(A) = ?$

- A) 2 B) 3 C) 4 D) 5 E) 9

19. $A, B \subset E$

$$n(A) + n(B) = 22$$

$$n(A \setminus B) + n(B \setminus A) = 12 \Rightarrow n(A \cap B) = ?$$

- A) 5 B) 6 C) 34 D) 10 E) 44

Yanıtlar / Answers

1. B	2. B	3. A	4. D	5. C	6. D
7. D	8. B	9. C	10. B	11. D	12. A
13. B	14. B	15. C	16. D	17. E	18. B
19. A					

1. $(B \cap A)' - B = ?$

- A) A B)
- A'
- C) B D)
- B'
- E)
- $\emptyset$

2. $(B \cap A)' - (A \cap B) = ?$

- A) A B)
- A'
- C) B D)
- B'
- E)
- $A \cap B$

- 3.
- $n(A) \neq 0$
- ,
- $n(B) \neq 0$
- ve (and)
- $(A' \cap B)' \cap B = A$
- olduğuna göre, aşağıdakilerden hangisi doğrudur?

Which one is correct?

- A) $(A \cap B) = \emptyset$ B) $(A \cap B') = \emptyset$
 C) $n(B) < n(A)$ D) $A \subset B$
 E) $B \subset A$

4. $n(A \cup B) = 34$

$n(A \cap B') = 2 \cdot n(B \cap A')$ ve (and)

$n(A \cap B) = 4 \Rightarrow n(A) = ?$

- A) 16 B) 18 C) 22 D) 24 E) 27

5. $n(A \cap B') + n(B \cap A') = 6 \cdot n(A \cap B)$

$n(A) = 3 \cdot n(B)$ ve (and) $n(A \cup B) = 42 \Rightarrow n(A) = ?$

- A) 12 B) 18 C) 24 D) 32 E) 36

6. $n(E) = 42$

$n(A') = 18$

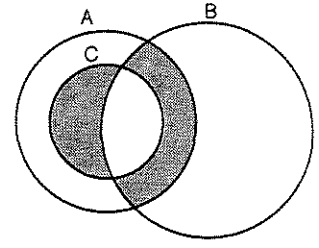
$n(B') = 20$

$n(A' \cap B') = 6 \Rightarrow n(A \cap B) = ?$

- A) 6 B) 7 C) 8 D) 10 E) 12

7. Taralı alan = ?

Shaded area



- A) $(A \setminus C) \cup (B \setminus A)$ B) $(A \cap B) \setminus C$
 C) $(A \cup B) \setminus (B \cap C)$ D) $C \setminus (A \cap B)$
 E) $[C \setminus (A \cap B)] \cup [(A \cap B) \setminus C]$

8. $n(A) = 3 \cdot n(B)$

$4 \cdot n(A \cap B) = n(B \setminus A)$

$n(A \cup B) = 38 \Rightarrow n(A \setminus B) = ?$

- A) 28 B) 32 C) 36 D) 40 E) 42

9. $n(A) = 4 \cdot n(B)$, $n(A \setminus B) = 41$

$n(A \cap B) = 3 \Rightarrow n(B \setminus A) = ?$

- A) 8 B) 12 C) 16 D) 21 E) 32

10. $[A \cap (B \cup B')] \cup (B' \cup A') = ?$

- A) $A \cup B'$ B) $A' \cap B$ C) $A \cap B'$
 D) $A \cap B$ E) A

11. $n(A \setminus B) = 9$, $n(B \setminus A) = 7$,

$n(A) + n(B) = 36 \Rightarrow n(A \cup B) = ?$

- A) 24 B) 26 C) 27 D) 28 E) 33

12. Aşağıdakilerden hangisi yanlıştır?

Which one is wrong?

- A) $(A \cap B') \cap B = \emptyset$
 B) $(B \cap A') \cap A = B$
 C) $E \setminus A' = A$
 D) $(A \cap B') \cup B = (A \cup B)$
 E) $A \cap (B \cup C)' = (A \cap B') \cap C'$

13. $n(A) = 3x$, $n(B) = 4x - 5$, $n(A \cap B) = x$

$n(A \cup B) = 67 \Rightarrow n(B' \cap A) = ?$

- A) 12 B) 24 C) 28 D) 34 E) 35

14. $A = \{x \mid 3 \leq x \leq 1600, x = 6k, k \in \mathbb{N}\}$

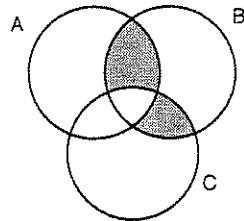
$B = \{y \mid 8 < y < 1200, y = 9n, n \in \mathbb{N}\}$

$n(A \cap B) = ?$

- A) 73 B) 69 C) 68 D) 67 E) 66

15. Taralı alan = ?

Shaded area = ?



- A) $A \cap B \cap C$ B) $(A \cap C) \setminus B$
 C) $(C \cap B) \setminus C$ D) $(A \cap B) \setminus (A \cap B \cap C)$
 E) $B \cap (A \cup C) \setminus (A \cap B \cap C)$

16. $A \subset E$ ve (and) $B \subset E$

$n(A) = 11$, $n(B) = 13$ ve (and) $n(A') = 11 \Rightarrow n(B') = ?$

- A) 9 B) 10 C) 11 D) 12 E) 13

17. $A = \{x \mid 150 < x < 500, x = 4 \cdot k, k \in \mathbb{Z}\}$

$B = \{y \mid 48 \leq y < 450, y = 6 \cdot m, m \in \mathbb{Z}\}$

$n(A \cap B) = ?$

- A) 23 B) 24 C) 25 D) 26 E) 27

18. $A = \{x \mid 100 < x \leq 400, x = 8 \cdot k, k \in \mathbb{Z}\}$

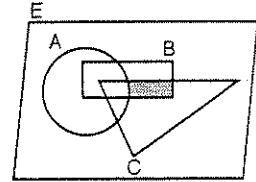
$B = \{y \mid 75 \leq y < 390, y = 6 \cdot m, m \in \mathbb{Z}\}$

$n(A \cup B) = ?$

- A) 78 B) 85 C) 108 D) 110 E) 113

19. Taralı alan = ?

Shaded area = ?



- A) $A \cap B \cap C$ B) $(B \cup C) \cap A'$ C) $(A \cup B) \cap C$
 D) $(A' \cup C) \cap B$ E) $A' \cap B \cap C$

20. $A \subset E$, $B \subset E$,

$n(A \cup B) = 22$,

$n(A \cap B') = 6$,

$n(B) = 2 \cdot n(A) \Rightarrow n(A) = ?$

- A) 7 B) 8 C) 9 D) 10 E) 11

Yanitlar / Answers

1. E	2. B	3. D	4. D	5. E	6. D
7. E	8. A	9. A	10. E	11. B	12. B
13. B	14. E	15. E	16. A	17. C	18. A
19. E	20. B				

Tanım : $a_0, a_1, a_2, \dots, a_n \in \mathbb{R}, n \in \mathbb{N}$ olmak üzere,
 $P(x) = a_0 + a_1x + a_2x^2 + \dots + a_nx^n$ biçiminde tanımlanan
ifadelere polinom denir. $a_0, a_1, a_2, \dots, a_n$ polinomun kat-
sayılarıdır.

Definition: A polynomial is any function f of the form
 $P(x) = a_0 + a_1x + a_2x^2 + \dots + a_nx^n$ where
 $a_0, a_1, a_2, \dots, a_n$ are real numbers ($\in \mathbb{R}$) and where n
is a natural number. $a_0, a_2, \dots, a_n$ are the coefficients of the
polynomial.

Örnek / Example:

1. $P(x) = 4x^6 - 3x^{-2} + 6x + 1$ ifadesi bir polinom değildir.
Çünkü, $-3x^{-2}$ 'li terimde x 'in üssü olan " -2 " doğal sayı
değildir.
 $P(x) = 4x^6 - 3x^{-2} + 6x + 1$ is not a polynomial. Because
the power of the term $-3x^{-2}$ is -2 , but -2 is not a nat-
ural number.

2. $P(x) = 6x^6 + 7x^3 + x^{\frac{1}{2}} + 3$ ifadesi bir polinom değildir.
Çünkü $x^{\frac{1}{2}}$ 'li terimde x 'in üssü olan " $\frac{1}{2}$ " doğal sayı de-
ğildir.

$P(x) = 6x^6 + 7x^3 + x^{\frac{1}{2}} + 3$ is not a polynomial.

Because of the power " $\frac{1}{2}$ ", " $\frac{1}{2}$ " is not a natural
number.

Örnek / Example:

$P(x)$ bir polinomdur. / $P(x)$ is a polynomial.

$P(x) = ax^6 + (a - b + 3)x^{-3} + (a + b - 9)x^{-2} + bx$

$\Rightarrow P(x) = ?$

- A) $2x^6 + 3x$ B) $3x^6 + 6x$ C) $5x^6 + 4x$
D) $2x^6 + 5x$ E) $3x^6 + 9x$

Çözüm / Solution:

$$a - b + 3 = 0$$

$$+ a + b - 9 = 0$$

$$2a - 6 = 0$$

$$a = 3 \text{ ve (and) } b = 6 \Rightarrow P(x) = 3x^6 + 6x$$

Yanıt / Answer B

Örnek / Example:

$P(x)$ bir polinomdur. / $P(x)$ is a polynomial.

$P(x^2) = (a - 2)x^5 + ax^4 + (b - 4)x^3 + 2bx^2 + 3b$

$\Rightarrow P(x) = ?$

- A) $2x^2 + 8x + 12$ B) $2x^2 + 4x + 1$
C) $4x^2 + 12x + 6$ D) $3x^2 + 5x + 8$
E) $2x^2 + 6x + 4$

Çözüm / Solution:

$$P((\sqrt{x})^2) = (a - 2)(\sqrt{x})^5 + a(\sqrt{x})^4 + (b - 4)(\sqrt{x})^3 + 2b(\sqrt{x})^2 + 3b$$

$$\Rightarrow P(x) = (a - 2)x^{\frac{5}{2}} + ax^2 + (b - 4)x^{\frac{3}{2}} + 2bx + 3b$$

$$\left. \begin{array}{l} a - 2 = 0 \Rightarrow a = 2 \\ b - 4 = 0 \Rightarrow b = 4 \end{array} \right\} \Rightarrow$$

$$P(x) = 2x^2 + 2 \cdot 4x + 3 \cdot 4 \\ = 2x^2 + 8x + 12$$

Yanıt / Answer A

Örnek / Example:

$$x^3 \cdot P(x) = ax^8 + (b - 2)x^5 + (a - 4)x + b - 5 \Rightarrow P(x) = ?$$

- A) $3x^5 + 2x^2$ B) $5x^2 + 4x^2$ C) $4x^5 + 3x^2$
D) $8x^5 + 2x^2$ E) $7x^5 + 2x^2$

Çözüm / Solution:

$$\frac{x^3 P(x)}{x^3} = \frac{ax^8}{x^3} + \frac{(b - 2)x^5}{x^3} + \frac{(a - 4)x}{x^3} + \frac{b - 5}{x^3}$$

$$P(x) = ax^5 + (b - 2)x^2 + (a - 4)x^{-2} + (b - 5)x^{-3}$$

$$a - 4 = 0 \text{ ve (and) } b - 5 = 0$$

$$a = 4, b = 5$$

$$P(x) = 4x^5 + (5 - 2)x^2 \\ = 4x^5 + 3x^2$$

Yanıt / Answer C

Örnek / Example:

$$P(x) = -3x^3 + 4x^2 - x + m + 1$$

$$P(2) = 4 \Rightarrow m = ?$$

Çözüm / Solution:

$$\begin{aligned} P(2) &= -3 \cdot 2^3 + 4 \cdot 2^2 - 2 + m + 1 = 4 \\ &= -3 \cdot 8 + 4 \cdot 4 - 2 + m + 1 = 4 \\ &= -24 + 16 - 2 + m + 1 = 4 \\ &= -9 + m = 4 \\ &= m = 9 + 4 \\ &= m = 13 \end{aligned}$$

Örnek / Example:

$$P(x) = 5x^6 - 4x^3 + 11 \Rightarrow P(\sqrt[3]{2}) = ?$$

Çözüm / Solution:

$$\begin{aligned} P(\sqrt[3]{2}) &= 5 \cdot (\sqrt[3]{2})^6 - 4 \cdot (\sqrt[3]{2})^3 + 11 \\ &= 5 \cdot 4 - 4 \cdot 2 + 11 \\ &= 20 - 8 + 11 \\ &= 23 \end{aligned}$$

Örnek / Example:

$$n \in \mathbb{Z}^+,$$

$$P(x) = 5 \cdot (x-2)^{2n} - 7 \cdot (2-x)^{2n-1} \Rightarrow P(1) = ?$$

Çözüm / Solution:

$$\begin{aligned} P(1) &= 5 \cdot (1-2)^{2n} - 7 \cdot (2-1)^{2n-1} \\ &= 5 \cdot (-1)^{2n} - 7 \cdot 1^{2n-1} \\ &= 5 \cdot 1 - 7 \cdot 1 \\ &= 5 - 7 \\ &= -2 \end{aligned}$$



POLİNOMLARDA EŞİTLİK

EQUALITY in POLYNOMIALS

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0$$

$$Q(x) = b_n x^n + b_{n-1} x^{n-1} + \dots + b_1 x + b_0$$

$$P(x) = Q(x) \Rightarrow a_n = b_n, a_{n-1} = b_{n-1}, \dots, a_1 = b_1, a_0 = b_0$$

Örnek / Example:

$$P(x) = (x^2 + 1) \cdot (x + 3)$$

$$Q(x) = x^3 + ax^2 + bx + c$$

$$P(x) = Q(x) \Rightarrow a = ?, b = ?, c = ?$$

Çözüm / Solution:

$$(x^2 + 1) \cdot (x + 3) = x^3 + ax^2 + bx + c$$

$$x^3 + 3x^2 + 1x + 3 = x^3 + ax^2 + bx + c$$

$$\Rightarrow a = 3, b = 1, c = 3$$

Örnek / Example:

$$P(x) = (x-2)(x^2 + px + 3) + x - 5$$

$$Q(x) = x^3 + 3x^2 + bx + c$$

$$P(x) = Q(x) \Rightarrow b + p = ?$$

$$A) -5 \quad B) -4 \quad C) -3 \quad D) -2 \quad E) -1$$

Çözüm / Solution:

$$P(x) = x^3 + x^2(p-2) + (4-2p)x - 11$$

$$Q(x) = x^3 + 3x^2 + bx + c$$

$$P(x) = Q(x) \Rightarrow \begin{cases} p-2=3 \Rightarrow p=5 \\ 4-2p=b \Rightarrow b=4-10=-6 \\ c=-11 \end{cases}$$

$$b + p = 5 - 6 = -1$$

Yanıt / Answer E



POLİNOMLARDA KATSAYILAR TOPLAMI

SUM of COEFFICIENTS in POLYNOMIAL FACTS

$P(x)$ polinomu verilirse,

1. $P(x)$ polinomunun katsayılarının toplamını bulmak için x yerine 1 yazılır.

$P(1)$, katsayıların toplamıdır.

2. $P(x)$ polinomunun sabit terimini bulmak için x yerine 0 (sıfır) yazılır.

$P(0)$, sabit terimdir.

If the $P(x)$ polynomial is given,

1. To find the sum of the coefficients of $P(x)$, write 1 instead of x .

$P(1)$, sum of the coefficients in polynomial.

2. To find the constant term of $P(x)$, write 0 instead of x .

$P(0)$, constant term in polynomial.

Örnek / Example:

$P(x) = (x^2 - x + 2)^3 (x^4 - 2x + 4)^2$ polinomunun katsayılarının toplamı kaçtır?

What is the sum of the coefficients of

$$P(x) = (x^2 - x + 2)^3 (x^4 - 2x + 4)^2 ?$$

- A) 48 B) 66 C) 72 D) 84 E) 90

Çözüm / Solution:

$$x = 1$$

$$P(1) = (1^2 - 1 + 2)^3 \cdot (1^4 - 2 + 4)^2$$

$$= (2)^3 \cdot (3)^2 = 8 \cdot 9 = 72$$

Yanıt / Answer C

Örnek / Example:

$P(x^3 + 8) = x^6 - 2x^3 + 1$ polinomu veriliyor. Buna göre,

$P(x)$ polinomunun sabit terimi kaçtır?

What is the constant term of $P(x^3 + 8) = x^6 - 2x^3 + 1$?

- A) 70 B) 72 C) 78 D) 81 E) 85

Çözüm / Solution:

$$x^3 + 8 = 0 \Rightarrow x^3 = -8 \Rightarrow x = -2$$

$$P(0) = (-2)^6 - 2(-2)^3 + 1$$

$$= 64 + 16 + 1$$

$$= 81$$

Yanıt / Answer D



POLİNOMLARDA TOPLAMA VE ÇIKARMA

SUM & SUBTRACTION in POLYNOMIAL FACTS

Toplama: İki polinom toplanırken dereceleri aynı olan terimlerin katsayıları toplanır ve toplam polinomu elde edilir.

The sum: To find the sum of two polynomials, we add the coefficients of the terms which are of the same degree.

Örnek / Example :

$$P(x) = 4x^3 + 6x - 1$$

$$Q(x) = 6x^3 + 2x + 9 \Rightarrow P(x) + Q(x) = ?$$

Çözüm / Solution :

$$\begin{aligned} P(x) + Q(x) &= 4x^3 + 6x - 1 + 6x^3 + 2x + 9 \\ &= 10x^3 + 8x + 8 \end{aligned}$$

Çıkarma: İki polinom çıkarılırken dereceleri aynı olan terimlerin katsayıları çıkarılır ve fark polinomu elde edilir.

Subtraction: To find the difference of two polynomials, we subtract the coefficients of the terms which are of the same degree.

Örnek / Example:

$$P(x) = 4x^4 - 5x^3 - 7$$

$$Q(x) = -3x^4 + 6x^3 + 3$$

$$\Rightarrow P(x) - Q(x) = ?$$

Çözüm / Solution :

$$\begin{aligned} P(x) - Q(x) &= (4x^4 - 5x^3 - 7) - (-3x^4 + 6x^3 + 3) \\ &= 4x^4 - 5x^3 - 7 + 3x^4 - 6x^3 - 3 \\ &= 7x^4 - 11x^3 - 10 \end{aligned}$$

Örnek / Example:

$$\left. \begin{aligned} P(x) &= 2x^3 - 4x^2 + 5x - 1 \\ Q(x) &= 6x^2 - 4x + 3 \end{aligned} \right\} \Rightarrow$$

$$\text{I. } P(x) + Q(x) = ?$$

$$\text{II. } P(x) - Q(x) = ?$$

Çözüm / Solution:

$$\text{I. } P(x) + Q(x) = \frac{2x^3 - 4x^2 + 5x - 1}{P(x)} + \frac{6x^2 - 4x + 3}{Q(x)}$$

$$= 2x^3 + 2x^2 + x + 2$$

$$\text{II. } P(x) - Q(x) = \frac{2x^3 - 4x^2 + 5x - 1}{P(x)} - \frac{(6x^2 - 4x + 3)}{Q(x)}$$

$$= 2x^3 - 4x^2 + 5x - 1 - 6x^2 + 4x - 3$$

$$= 2x^3 - 10x^2 + 9x - 4$$

Örnek / Example:

$$\left. \begin{array}{l} P(x) = x^4 - x^3 + 2x^2 + 3x + 2 \\ Q(x) = -x^4 + 3x^2 - x + 5 \end{array} \right\} \Rightarrow$$

- I. $P(x) + Q(x) = ?$
II. $P(x) - Q(x) = ?$

Çözüm / Solution:

$$\begin{aligned} \text{I. } P(x) + Q(x) &= \underbrace{x^4 - x^3 + 2x^2 + 3x + 2}_{P(x)} + \underbrace{-x^4 + 3x^2 - x + 5}_{Q(x)} \\ &= -x^3 + 5x^2 + 2x + 7 \end{aligned}$$

$$\begin{aligned} \text{II. } P(x) - Q(x) &= \underbrace{x^4 - x^3 + 2x^2 + 3x + 2}_{P(x)} - \underbrace{(-x^4 + 3x^2 - x + 5)}_{Q(x)} \\ &= x^4 - x^3 + 2x^2 + 3x + 2 + x^4 - 3x^2 - x - 5 \end{aligned}$$



POLİNOMLARDA ÇARPMA

MULTIPLICATION in POLYNOMIAL FACTS

İki polinomun çarpımı polinomlardan birinin her teriminin diğer polinomun her bir terimi ile ayrı ayrı çarpımlarından elde edilen terimlerin toplamına eşittir.

The product of two polynomials equals the sum of the terms that are constituted by multiplying each terms of one polynomial with each terms of the other polynomial.

Örnek / Example :

$$\left. \begin{array}{l} P(x) = x^2 - 3x + 4 \\ Q(x) = x^3 - 2x^2 - 1 \end{array} \right\} \Rightarrow P(x) \cdot Q(x) = ?$$

Çözüm / Solution:

$$\begin{aligned} P(x) \cdot Q(x) &= (x^2 - 3x + 4) \cdot (x^3 - 2x^2 - 1) \\ &= x^5 - 2x^4 - x^2 - 3x^4 + 6x^3 + 3x + 4x^3 - 8x^2 - 4 \\ &= x^5 - 5x^4 + 10x^3 - 9x^2 + 3x - 4 \end{aligned}$$

Örnek / Example:

$$\begin{aligned} P(x) &= x^3 - x^2, \quad Q(x) = x^2 + ax - 9, \\ P(x) \cdot Q(x) &= x^5 + 4x^4 - 14x^3 + 9x^2 \Rightarrow a = ? \end{aligned}$$

Çözüm / Solution:

$$\begin{aligned} P(x) \cdot Q(x) &= (x^3 - x^2) \cdot (x^2 + ax - 9) \\ &= x^5 + ax^4 - 9x^3 - x^4 - ax^3 + 9x^2 \\ &= x^5 + (a - 1)x^4 - (9 + a)x^3 + 9x^2 \\ a - 1 &= 4 \Rightarrow a = 5 \end{aligned}$$

Örnek / Example:

$$\begin{aligned} P(x) \cdot Q(x) &= x^4 + x^3 - 3x^2 - 4x - 4 \\ P(x) &= x^2 - 4, \quad Q(x) = x^2 + ax + 1 \Rightarrow a = ? \end{aligned}$$

Çözüm / Solution:

$$\begin{aligned} P(x) \cdot Q(x) &= (x^2 - 4) \cdot (x^2 + ax + 1) \\ &= x^4 + ax^3 + x^2 - 4x^2 - 4ax - 4 \\ &= x^4 + ax^3 - 3x^2 - 4ax - 4 \\ &= ax^4 + ax^3 - 3x^2 - 4ax - 4 \\ &= ax^3 = x^3 \\ a &= 1 \end{aligned}$$

Örnek / Example:

$$\begin{aligned} P(x) &= 2x^3 - 4x^2 - 3x + 5 \\ Q(x) &= -3x^4 - 2 \\ \Rightarrow P(x) \cdot Q(x) &= ? \end{aligned}$$

Çözüm / Solution:

$$\begin{aligned} P(x) \cdot Q(x) &= (2x^3 - 4x^2 - 3x + 5) \cdot (-3x^4 - 2) \\ &= -6x^7 - 4x^3 + 12x^6 + 8x^2 + 9x^5 + 6x - 15x^4 - 10 \\ &= -6x^7 + 12x^6 + 9x^5 - 15x^4 - 4x^3 + 8x^2 + 6x - 10 \end{aligned}$$



POLİNOMLARDA BÖLME DIVISION in POLYNOMIAL FACTS

Bölme Özdeşliği / Identity of Division

$$\begin{array}{r} P(x) \overline{) Q(x)} \\ \underline{K(x)} \end{array}$$

$$P(x) = Q(x) \cdot T(x) + K(x)$$

$K(x)$ kalandır. / $K(x)$ is the remainder.

Örnek / Example:

$$\left. \begin{array}{r} P(x) \overline{) x-3} \\ \underline{4} \\ Q(x) \overline{) x+3} \\ \underline{2} \end{array} \right\} \Rightarrow \begin{array}{r} P(x) \overline{) x^2-9} \\ \underline{?} \end{array}$$

- A) $3x+4$ B) $2x-2$ C) $2x+7$
D) $4x+1$ E) $5x+4$

Çözüm / Solution:

$$\begin{array}{r} P(x) \overline{) x-3} \\ \underline{4} \\ Q(x) \end{array}$$

$$P(x) = (x-3) \cdot Q(x) + 4$$

$$\begin{array}{r} Q(x) \overline{) x+3} \\ \underline{2} \\ T(x) \end{array}$$

$$Q(x) = (x+3) \cdot T(x) + 2$$

$$P(x) = (x-3) [(x+3) \cdot T(x) + 2] + 4$$

$$= (x^2 - 9) \cdot T(x) + 2x - 6 + 4$$

$$= (x^2 - 9) \cdot T(x) + 2x - 2$$

Kalan / Remainder : $2x - 2$

Yanıt / Answer B

KURAL I: Bir $P(x)$ polinomunun $x + a$ ile bölümünden kalanı bulmak için $x + a = 0 \Rightarrow x = -a$ belirlenir.

$P(x)$ polinomundaki x 'in yerine $(-a)$ yazılırsa işlemin sonucu kalanı verir.

$x + a$ birinci dereceden bir polinom olduğu için kalan sıfırdan farklı bir polinom, yani; reel bir sayı olmak zorundadır.

$$P(x) = (x + a) \cdot T(x) + K$$

$$P(-a) = (-a + a) \cdot T(x) + K = K$$

$$\Rightarrow P(-a) = K$$

RULE I : To find the remainder of $P(x)$ divided by $(x+a)$ the following is determined:

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

If we write $(-a)$ instead of x in $P(x)$, then the result gives the remainder. Since $(x+a)$ is a first order polynomial, the remainder must always be equal to a real number, which is a zero polynomial.

$$P(x) = (x + a) \cdot T(x) + K$$

$$P(-a) = (-a + a) \cdot T(x) + K = K \Rightarrow P(-a) = K$$

Örnek / Example:

$$\left. \begin{array}{r} P(x) = x^3 - 2x^2 + ax + 8 \\ P(x) \overline{) x-2} \\ \underline{18} \end{array} \right\} \Rightarrow a = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

Çözüm / Solution:

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

$$P(2) = 2^3 - 2 \cdot 2^2 + a \cdot 2 + 8$$

$$18 = 8 - 8 + 2a + 8$$

$$2a = 10 \Rightarrow a = 5$$

Yanıt / Answer E

Örnek / Example:

$$P(3x+4) = x^3 + x^2 - x + 9 \Rightarrow$$

$$\begin{array}{r} P(x) \overline{) x+2} \\ \underline{?} \end{array}$$

- A) 13 B) 9 C) 11 D) 10 E) 7

Çözüm / Solution:

$$1. \quad x + 2 = 0 \Rightarrow x = -2$$

$$2. \quad 3x + 4 = -2$$

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

$$P(3 \cdot (-2) + 4) = (-2)^3 + (-2)^2 - (-2) + 9$$

$$P(-2) = -8 + 4 + 2 + 9 = 7$$

Yanıt / Answer E

Örnek / Example:

$$P(4x-1) = x^3 - x^2 + 2x - 5 \Rightarrow$$

$$\begin{array}{r|l} P(x) & x-3 \\ \hline & ? \end{array}$$

- A) 2 B) 1 C) 0 D) -1 E) -3

Çözüm / Solution:

- $x-3=0 \Rightarrow x=3$
- $4x-1=3$
 $4x=4 \Rightarrow x=1$
 $P(4 \cdot 1 - 1) = 1^3 - 1^2 + 2 \cdot 1 - 5$
 $P(3) = 1 - 1 + 2 - 5$
 $= -3$

Yanıt / Answer E**KURAL II / RULE II:** $(x-a) \cdot P(x) = Q(x) \Rightarrow Q(a) = 0$ **Örnek / Example:**

$$(x-1)P(x) = x^4 + ax^3 + 3x - 7 \Rightarrow a = ?$$

- A) 2 B) 3 C) 5 D) 7 E) 8

Çözüm / Solution:

$$\begin{aligned} x-1 &= 0 \Rightarrow x=1 \\ 1^4 + a \cdot 1^3 + 3 \cdot 1 - 7 &= (1-1)P(1) \\ 1 + a + 3 - 7 &= 0 \\ a &= 3 \end{aligned}$$

Yanıt / Answer B**Örnek / Example:**

$$(x-2)P(x) = x^4 - ax^2 + 2x + 8 \Rightarrow$$

$$\begin{array}{r|l} P(x) & x-1 \\ \hline & ? \end{array}$$

- A) -4 B) -3 C) -1 D) 3 E) 5

Çözüm / Solution:

- $x-2=0 \Rightarrow x=2$
 $(2-2)P(2) = 16 - 4a + 4 + 8$
 $0 = 28 - 4a$
 $a = 7$
- $x-1=0 \Rightarrow x=1$
 $(1-2)P(1) = 1 - 7 + 2 + 8$
 $-1P(1) = 4$
 $P(1) = -4$
Kalan / Remainder = $P(1) = -4$

Yanıt / Answer A**Örnek / Example:**

$$9x^2 + 3x + 7 = (3x+1) \cdot Q(x) + a \Rightarrow a = ?$$

- A) 1 B) 2 C) 4 D) 7 E) 9

Çözüm / Solution:

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

$$9\left(-\frac{1}{3}\right)^2 + 3\left(-\frac{1}{3}\right) + 7 = \left(3\left(-\frac{1}{3}\right) + 1\right) \cdot Q\left(-\frac{1}{3}\right) + a$$

$$9 \cdot \frac{1}{9} - 3 \cdot \frac{1}{3} + 7 = a$$

$$a = 1 - 1 + 7$$

$$a = 7$$

Yanıt / Answer D

KURAL III: Bir $P(x)$ polinomunun $x^n \pm a$ ile bölümünden kalanını bulmak için $x^n \pm a = 0$ 'dan $x^n = \pm a$ bulunur. Polinomda x^n yerine $\pm a$ değeri yerine yazılarak kalan bulunur.

RULE III: To find the remainder of $P(x)$ divided by $(x^n \pm a)$, insert $(x^n = \pm a)$ in the polynomial $P(x)$, which means inserting $\pm a$ instead of x^n on the polynomial.

Örnek / Example:

$$P(x) = x^{16} - 2x^{11} + 6x^6 + 3 \Rightarrow$$

$$\begin{array}{r|l} P(x) & x^5 + 2 \\ \hline & ? \end{array}$$

- A) $-28x + 3$ B) $4x + 9$ C) $-17x + 21$
D) $-14x + 7$ E) $21x + 18$

Çözüm / Solution:

$$x^5 + 2 = 0 \Rightarrow x^5 = -2$$

$$P(x) = x \cdot x^{15} - 2x \cdot x^{10} + 6x \cdot x^5 + 3$$

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

$$\begin{aligned} \text{Kalan / Remainder} &= x(-2)^3 - 2x(-2)^2 + 6x(-2) + 3 \\ &= -8x - 8x - 12x + 3 \\ &= -28x + 3 \end{aligned}$$

Yanıt / Answer A**Örnek / Example:**

$$(x^2 + 4)P(x) + 8x = ax^2 + 2ax + b + 3 \Rightarrow b = ?$$

- A) 6 B) 8 C) 10 D) 13 E) 15

Çözüm / Solution:

$$x^2 + 4 = 0 \Rightarrow x^2 = -4$$

$$((-4) + 4) \cdot P(x) + 8x = a(-4) + 2ax + b + 3$$

$$8x = 2ax + b - 4a + 3$$

$$2a = 8 \Rightarrow a = 4$$

$$b - 4a + 3 = 0$$

$$b - 16 + 3 = 0$$

$$b = 13$$

Yanıt / Answer D**Örnek / Example:**

$$P(-1) = 10,$$

$$P(1) = 4 \Rightarrow$$

$$\begin{array}{r|l} P(x) & x^2 + 1 \\ \hline & x + 2 \\ \hline & ? \end{array}$$

- A) $2x + 1$ B) $-5x + 3$ C) $-3x + 7$
D) $8x + 4$ E) $-2x - 4$

Çözüm / Solution:

$$P(x) = (x^2 + 1)(x + 2) + ax + b$$

$$x = 1 \Rightarrow P(1) = 6 + a + b = 4 \Rightarrow a + b = -2$$

$$x = -1 \Rightarrow P(-1) = 2 - a + b = 10 \Rightarrow \begin{array}{l} b - a = 8 \\ \hline 2b = 6 \\ b = 3 \end{array}$$

$$a = -5 \Rightarrow ax + b = -5x + 3$$

Yanıt / Answer B**Örnek / Example:**

$$P(x) = x^3 - 3x^2 + 4x - 9$$

$$\begin{array}{r|l} P(x) & x^2 - x + 1 \\ \hline & \\ \hline & ? \end{array}$$

- A) $2x + 5$ B) $x + 9$ C) $x - 7$
D) $3x - 5$ E) $5x + 8$

Çözüm / Solution:

$$x^2 - x + 1 = 0 \Rightarrow x^2 = x - 1$$

$P(x)$ teki x^2 yerine $x - 1$ yazılırsa aşağıdaki eşitlik bulunur.

If we write $x-1$ instead of x^2 in $P(x)$, we obtain.

$$P(x) = x \cdot x^2 - 3x^2 + 4x - 9$$

$$\begin{aligned} \text{Kalan / Remainder} &= x(x-1) - 3(x-1) + 4x - 9 \\ &= x^2 - x - 3x + 3 + 4x - 9 \\ &= x - 1 - 6 = x - 7 \end{aligned}$$

Yanıt / Answer C**KURAL IV :**

- $P(x)$ ve $Q(x)$ polinomları $x - a$ 'ya bölündüğünde kalanlar sırayla A ve B olsun.
 - $P(x) \pm Q(x)$ polinomu $(x-a)$ ile bölündüğünde kalan $A \pm B$ dir.
 - $P(x) \cdot Q(x)$ polinomu $(x-a)$ ile bölündüğünde kalan $A \cdot B$ dir.
- $P(x)$ polinomu $(x-a)$ ile bölündüğünde kalan A, $(x-b)$ ile bölündüğünde kalan B dir. $P(x)$ polinomu $(x-a)(x-b)$ 'ye bölündüğünde kalan $K(x) = mx + n$ biçimindedir.

RULE IV :

- The remainders of $P(x)$ and $Q(x)$ divided by $(x-a)$ are equal to A and B, respectively.
 - The remainder of $P(x) \pm Q(x)$ divided by $(x-a)$ is equal to $A \pm B$.
 - The remainder of $P(x) \cdot Q(x)$ divided by $(x-a)$ equal to $A \cdot B$.
- The remainders of $P(x)$ divided by $(x-a)$ and $(x-b)$ are equal to A and B, respectively. Then the remainder of $P(x)$ divided by $(x-a) \cdot (x-b)$ is in the form of $K(x) = mx + n$.

Örnek / Example:

$$\left. \begin{array}{l} P(x) \overline{) x-4} \\ \underline{-} \\ 3 \\ Q(x) \overline{) x-4} \\ \underline{-} \\ 4 \end{array} \right\} \Rightarrow$$

$$\begin{array}{r} x \cdot P(x) + (x+1) \cdot Q(x) + x^2 + 2x \overline{) x-4} \\ \underline{-} \\ ? \end{array}$$

- A) 56 B) 48 C) 46 D) 44 E) 40

Çözüm / Solution:

- $x - 4 = 0 \Rightarrow x = 4$
 $P(4) = 3, Q(4) = 4$
- Kalan (Remainder) = $4P(4) + (4+1) \cdot Q(4) + 4^2 + 2 \cdot 4$
 $= 4 \cdot 3 + 5 \cdot 4 + 16 + 8$
 $= 12 + 20 + 24$
 $= 56$

Yanıt / Answer A

Örnek / Example:

$$\left. \begin{array}{l} P(x) \overline{) (3x-4)^2} \\ \underline{-} \\ 12x+7 \end{array} \right\} \Rightarrow \left. \begin{array}{l} P(x) \overline{) 3x-4} \\ \underline{-} \\ ? \end{array} \right\}$$

- A) 15 B) 17 C) 19 D) 21 E) 23

Çözüm / Solution:

$$3x - 4 = 0 \Rightarrow x = \frac{4}{3}$$

$$P(x) = (3x-4)^2 Q(x) + 12x + 7$$

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

$$P\left(\frac{4}{3}\right) = \underbrace{\left(\frac{4}{3} \cdot 3 - 4\right)^2}_{0} Q\left(\frac{4}{3}\right) + 12 \cdot \frac{4}{3} + 7$$

$$\begin{aligned} \text{Kalan (Remainder)} &= 0 + 4 \cdot 4 + 7 \\ &= 23 \end{aligned}$$

Yanıt / Answer E

Örnek / Example:

$$\left. \begin{array}{l} P(x) \overline{) x-2} \\ \underline{-} \\ 5 \\ P(x) \overline{) x-3} \\ \underline{-} \\ 9 \end{array} \right\} \Rightarrow \left. \begin{array}{l} P(x) \overline{) (x-2) \cdot (x-3)} \\ \underline{-} \\ ? \end{array} \right\}$$

- A) $2x - 7$ B) $4x + 8$ C) $4x - 3$
D) $8x + 9$ E) $12x - 1$

Çözüm / Solution:

$$K(x) = mx + n$$

$$x - 2 = 0 \Rightarrow x = 2 \Rightarrow 2m + n = 5$$

$$x - 3 = 0 \Rightarrow x = 3 \Rightarrow \begin{array}{r} 3m + n = 9 \\ -m = -4 \end{array}$$

$$m = 4 \text{ ve (and) } n = -3$$

$$K(x) = 4x - 3$$

Yanıt / Answer C

Örnek / Example:

$$\left. \begin{array}{l} P(x) = x^3 - x^2 + ax + b \\ P(x) \overline{) x^2 - 3x + 2} \\ \underline{-} \\ 0 \end{array} \right\} \Rightarrow a + b = ?$$

- A) 5 B) 4 C) 2 D) 0 E) -2

Çözüm / Solution:

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

$$1. \quad x - 1 = 0 \Rightarrow x = 1$$

$$P(1) = 1 - 1 + a + b = 0 \Rightarrow a = -b$$

$$2. \quad x - 2 = 0 \Rightarrow x = 2$$

$$P(2) = 8 - 4 + 2a + b = 0$$

$$2a + b + 4 = 0$$

$$-2b + b + 4 = 0$$

$$b = 4 \text{ ve } a = -4$$

$$a + b = 4 + (-4) = 0$$

Yanıt / Answer D