ÜNİTE 15

Unit 15

Fonksiyonlar / Functions

Tanım (Defintion)

A'dan B'ye tanımlı bir f bağıntısının fonksiyon olabilmesi için;

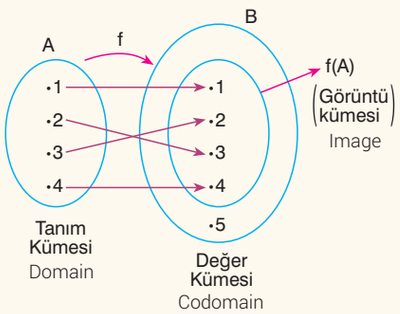
i) A'da boşta eleman kalmayacak B'de kalabilir.

ii) A'daki her elemanın bir tane görüntüsü olmalıdır.

In order for a relation f defined from A to B to be a function;

i) No idle staff will be left in A, but also in B

ii) Each element in A must have one view.

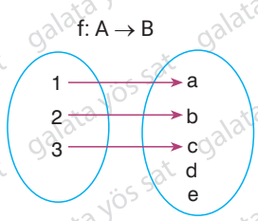


- n(A) = m, n(B) = n

  A'dan B'ye tanımlanabilecek fonksiyon sayısı n^m dir.

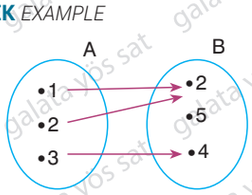
The number of functions that can be defined from A to B is n^m.

ÖRNEK *EXAMPLE*



f A'dan B'ye fonksiyon ve f = {(1, a), (2, b), (3, c)} biçimindede gösterilir.

ÖRNEK *EXAMPLE*

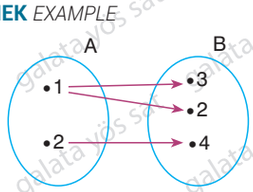


Tanım kümesi A = {1, 2, 3} *Domain*

Görüntü kümesi f(A) = {2, 4} *Image*

Değer kümesi B = {2, 4, 5} *Codomain*

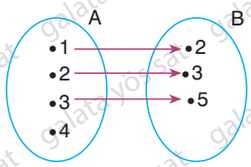
ÖRNEK *EXAMPLE*



f; A'dan B' ye fonksiyon değildir.

1 sayısı hem 2 sayısına, hem de 3 sayısına gitmiş fonksiyon olmaz.

ÖRNEK *EXAMPLE*



f: A'dan B'ye fonksiyon olmaz, A'dan boşta eleman kalmış.

ÖRNEK *EXAMPLE*

f(x) = 3x + 5

⇒ **f(5) = ?**

ÇÖZÜM *SOLUTION*

x = 5 için, f(5) = 3 · 5 – 5 = 10

ÖRNEK *EXAMPLE*

f(x + 2) = 4x – 1

⇒ **f(4) = ?**

ÇÖZÜM *SOLUTION*

x + 2 = 4

x = 2 için f(4) = 4 · 2 – 1 = 7

ÖRNEK *EXAMPLE*

f(2x – 3) = 4k – 7 ve f(–1) = 5

⇒ **k = ?**

ÇÖZÜM *SOLUTION*

2x – 3 = – 1

x = 1 için f(– 1) = 4k – 7 = 5

4k = 12

k = 3

ÖRNEK *EXAMPLE*

f(x) = 2x + 3

⇒ **f(2x + 1) = ?**

ÇÖZÜM *SOLUTION*

x = 2x + 1 için; f(2x + 1) = 2.(2x + 1) + 3

= 4x + 5

ÖRNEK *EXAMPLE*

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

$f(a) = 81$

$\Rightarrow$ **a = ?**

ÇÖZÜM *SOLUTION*

x = a için; $f(a) = 3^{a-1} = 81$

$3^{a-1} = 3^4$

$a = 5$

ÖRNEK *EXAMPLE*

$f(2x - 3) = 5x + 7$

$\Rightarrow$ **f(x) = ?**

ÇÖZÜM *SOLUTION*

$2x - 3 \rightarrow x$

$2x \rightarrow x + 3$

$x \rightarrow \frac{x+3}{2}$ için $f(x) = 5 \cdot \frac{x+3}{2} + 7$

$= \frac{5x + 29}{2}$

ÖRNEK *EXAMPLE*

f(x) parçalı fonksiyondur.

$$f(x) = \begin{cases} x^2 + 1, & x < 0 \\ 2x - 3, & x \geq 0 \end{cases}$$

$\Rightarrow$ **f(– 2) + f(3) = ?**

ÇÖZÜM *SOLUTION*

$f(-2) = (-2)^2 + 1 = 5$

$f(3) = 2 \cdot 3 - 3 = 3 \Rightarrow f(-2) + f(3) = 8$

ÖRNEK *EXAMPLE*

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

$f(2) = 1$

$\Rightarrow$ **f(5) = ?**

ÇÖZÜM *SOLUTION*

x = 2 için; $f(3) - f(2) = 2$

x = 3 için; $f(4) - f(3) = 2$

x = 4 için; $f(5) - f(4) = 2$

$+$

$f(5) - f(2) = 6$

$f(5) - 1 = 6$

$f(5) = 7$

Sıra Sizde — It Is Your Turn

1. $f(x) = 10x + 7$

$\Rightarrow$ **f(2) = ?**

2. $f(x + 5) = 4x - 5$

$\Rightarrow$ **f(7) = ?**

3. $f(x + 1) = 3m - 13$, $f(3) = 5$

$\Rightarrow$ **m = ?**

4. $f(x) = 2x + 1$

$\Rightarrow$ **f(3x –1) = ?**

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

$\Rightarrow$ $\frac{f(x+1)}{f(x-1)}$ **= ?**

6. $$f(x) = \begin{cases} x + 5, & x > 2 \\ 2x - 1, & x \leq 2 \end{cases}$$

$\Rightarrow$ **f(3) + f(0) = ?**

Cevaplar — Answer

1) 27 2) 3 3) 6 4) 6x – 1

5) 9 6) 7

Fonksiyonlarda Dört İşlem

$f: A \rightarrow R$, $g: B \rightarrow R$, $A \cap B \neq \varnothing$

I) $(f \mp g): (A \cap B) \rightarrow R$

$(f \mp g)(x) = f(x) \mp g(x)$

II) $(f \cdot g): (A \cap B) \rightarrow R$

$(f \cdot g)(x) = f(x) \cdot g(x)$

$c \in R$ olmak üzere,

$(c \cdot f): A \rightarrow R$ ve $(c \cdot f)(x) = c \cdot f(x)$

III) $\frac{f}{g}: (A \cap B) \rightarrow R$ ve $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$ $(g(x) \neq 0)$

ÖRNEK *EXAMPLE*

$f: \{1, 2, 3\} \to R$, $f(x) = 4x$

$q: \{2, 3, 4\} \to R$ $g(x) = 2x + 1$

⇒ **$(f \cdot g)(x)$ in görüntü kümesi nedir?** *Image*

ÇÖZÜM *SOLUTION*

$\{1, 2, 3\} \cap \{2, 3, 4\} = \{2, 3\}$

$(f \cdot g)(2) = f(2) \cdot g(2) = 8 \cdot 5 = 40$

$(f \cdot g)(3) = f(3) \cdot g(3) = 12 \cdot 7 = 84$

$\{40, 84\}$

ÖRNEK *EXAMPLE*

$f(x) = 3x - 2$, $g(x) = x + 5$

⇒ **$(f + g)(x)$ =?**

ÇÖZÜM *SOLUTION*

$f(x) + g(x) = 3x - 2 + x + 5 = 4x + 3$

ÖRNEK *EXAMPLE*

$f(x) = 2x - 1$, $g(x) = x^2 + 3$

⇒ **$(2 \cdot f - g(x)$ = ?**

ÇÖZÜM *SOLUTION*

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

$= -x^2 + 4x - 5$

Sıra Sizde | It Is Your Turn

1. $f: \{1,2, 3, 4\} \to R$, $f(x) = 2x$

$g: \{2, 3, 4, 5\} \to R$, $g(x) = x^2$

⇒ **$(f + g)(x)$ in görüntüsü nedir?**

2. $f(x) = 3x + 5$, $g(x) = x^2 + 1$

⇒ **$(f - g)(x)$ = ?**

3. $f(x) = 3x - 1$, $g(x) = 4x + 3$

⇒ **$(2f + 3g)(x)$ = ?**

4. $g(x) = x^2 + 2$, $h(x) = 5x - 7$

⇒ **$(g + h)(1)$ = ?**

5. $f(x + 1) = x^2 + 1$, $g(2x) = 2x - 3$

⇒ **$(f - g)(1)$ = ?**

6. $f(x) = \frac{3x - 2}{5}$, $g(x) = \frac{2x + 1}{3}$

⇒ $(f \cdot g)(4)$ = ?

Cevaplar | Answer

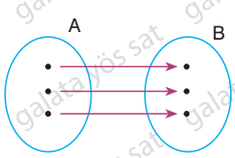
1) $\{8, 15, 24\}$ 2) $-x^2 + 3x + 4$ 3) $18x + 7$

4) 1 5) 3 6) 6

Fonksiyon Türleri

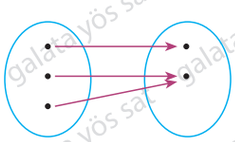
1) Bire Bir Fonksiyon (1-1): | 1) One to One Function (1-1)

Tanım kümesindeki her elemanının görüntüleri birbirinden farklı olan fonksiyonlardır.



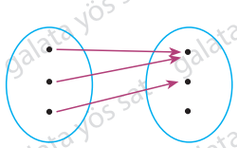
2) Örten Fonksiyon | 2) Surjective Function

Değer kümesinde boşta eleman kalmayacak. $(n(A) \geq n(B))$



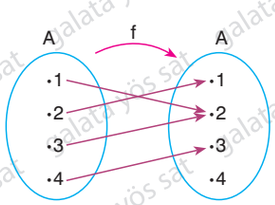
3) İçine Fonksiyon | 3) Into Function

Değer kümesinde en az bir eleman boşta kalacak.



ÖRNEK *EXAMPLE*

$A = \{1, 2, 3, 4\}$



bağıntısı;

→ A'dan A'ya bir fonksiyondur. *It is an A to A function.*

→ İçine fonksiyondur. *It is an into function*

→ Örten değildir. *It is not surjective*

→ Bire bir değildir. *It is not one to one.*

ÖRNEK *EXAMPLE*

$A = \{0, 3, 6, 9\}$

$B = \{a, b, c\}$

⇒ A → B 'ye kaç fonksiyon tanımlanır?

How many functions are defined in A → B?

ÇÖZÜM *SOLUTION*

$n(B)^{n(A)} = 3^4 = 81$

ÖRNEK *EXAMPLE*

$A = \{1, 2, 3\}$

$B = \{a, b, c, d, e\}$

⇒ f(1) ≠ c olacak şekilde A'dan B'ye kaç değişik bire bir fonksiyon yazılır?

How many different one to one functions are written from A to B such that f (1)?

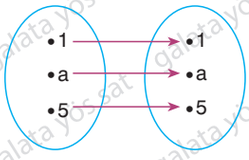
ÇÖZÜM *SOLUTION*

1 , 2 , 3

$4 \cdot 4 \cdot 3 = 48$

Birim Fonksiyon / Identity Function

Her elemanı kendisine götürür. *Takes every element to itself.*



$f: R \to R, \quad f(x) = x$

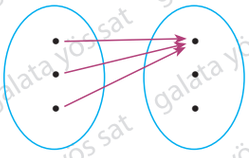
$f(3a) = 3a$

fonksiyonları birim fonksiyondur.

Sabit Fonksiyon / Constant Function

Tüm elemanlar aynı elemana gider.

All elements go to the same element.



$f: R \to R, \ \forall x \in R$ için $f(x) = c \ (c \in R)$

şeklinde ifade edilir.

Doğrusal Fonksiyon / Linear Function

$m, n \in R$ ve $m \neq 0$

$f(x) = mx + n$

şeklinde tanımlanan fonksiyonlardır.

ÖRNEK *EXAMPLE*

$f(x) = (n + 1) \cdot x$

birim fonksiyon ise f(n) = ?

f(x) identity function

ÇÖZÜM *SOLUTION*

$n + 1 = 1$ ya da $f(x) = f(n) = f(0) = 0$

$n = 0$

ÖRNEK *EXAMPLE*

$f(x) = (a + 1)x^2 + (b - 2)x + ab$

f(x) sabit fonksiyon ⇒ f(5) = ?

f(x) constant function

ÇÖZÜM *SOLUTION*

Sabit fonksiyonda değişken olmaz.

$a + 1 = 0, \quad b - 2 = 0$

$a = -1 \quad b = 2$

$f(x) = (-1) \cdot 2 = -2$

$f(5) = -2$

ÖRNEK *EXAMPLE*

f(x) doğrusal fonksiyon

$f(1) = 2, \ f(-1) = 4$

⇒ f(3) = ?

ÇÖZÜM *SOLUTION*

$f(x) = mx + n$

$f(1) = m + n = 2$

$f(-1) = -m + n = 4 \Rightarrow m = -1$

$n = 3$

$f(x) = -x + 3$

$f(3) = -3 + 3 = 0$

Sıra Sizde — It Is Your Turn

1. $f(x) = (a + 3)x$

f(x) birim fonksiyon, *f(x) identity function.*

⇒ **f(2a) = ?**

2. $f(1 - 3x) = ax + b - 2$

f(x) birim fonksiyon, *f(x) identity function*

⇒ **f(a + b) =?**

3. $f(x) = (m - 4)x + 5$

f(x) sabit fonksiyon, *f(x) constant function*

⇒ **f(m) = ?**

4. **f(x) doğrusal fonksiyondur.** *f(x) is a linear function.*

$f(0) = 3$, $f(1) = 5$

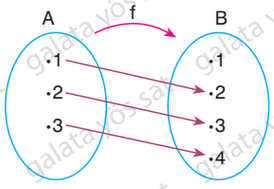
⇒ **f(4) = ?**

5. **f(x) doğrusal fonksiyondur.** *f(x) is a linear function.*

$f(x) + f(x - 1) = 6x - 15$

⇒ $f(2) = ?$

6.



bağıntısı için, *for the relation,*

I. fonksiyondur. *unction.*

II. Bire bir'dir. *one to one.*

III. Örtendir. *Surjective.*

⇒ **hangileri doğrudur?** *which ones are correct?*

7. $A = \{a, b, c\}$

$B = \{1, 2\}$

⇒ **A → B ye kaç fonksiyon tanımlanabilir?**

How many functions can be defined?

8. $A = \{a, b, c\}$

$B = \{1, 2, 3, 4\}$

⇒ **f(b) ≠ 3 olacak şekilde A'dan B'ye kaç değişik bire bir fonksiyon yazılır?**

How many different one to one functions are written from A to B such that f (b)?

Cevaplar — Answer

1) – 4	2) 0	3) 5	4) 11
5) 0	6) I - II	7) 8	8) 18

Bir Fonksiyonun Tersi — Inverse of a Function

- f: A → B'ye birebir ve örtense terside fonksiyondur.

  y = f(x) fonksiyonunun tersini bulmak için x tek bırakılır ve x yerine y, yerine x yazılarak $y = f^{-1}(x)$ bulunur.

  f: one-to-one and surjective function.

  To find the inverse of the function y = f (x), leave x alone and replace x with y and replace x with y = f –1 (x).

- $f(x) = y \Rightarrow f^{-1}(y) = x$

ÖRNEK *EXAMPLE*

$f(x) = x + 3$

⇒ **$f^{-1}(x) = ?$**

ÇÖZÜM *SOLUTION*

$y = x + 3$

$y - 3 = x$

$x - 3 = y = f^{-1}(x)$

ÖRNEK *EXAMPLE*

$f(x) = 2x + 1$

⇒ **$f^{-1}(x) = ?$**

ÇÖZÜM *SOLUTION*

$y = 2x + 1$

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

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

ÖRNEK *EXAMPLE*

$f(x) = 7x$

$\Rightarrow f^{-1}(x) = ?$

ÇÖZÜM *SOLUTION*

$y = 7x$

$\frac{y}{7} = x$

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

Not (Note)

1. $f(x) = ax$
   $f^{-1}(x) = \frac{x}{a}$
2. $f(x) = x + a$
   $f^{-1}(x) = x - a$
3. $f(x) = ax + b$
   $f^{-1}(x) = \frac{x - b}{a}$
4. $f(x) = \frac{ax + b}{cx + d}$
   $f^{-1}(x) = \frac{-dx + b}{cx - a}$

ÖRNEK *EXAMPLE*

$f(x) = 3x$

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

ÖRNEK *EXAMPLE*

$f(x) = x + 5$

$f^{-1}(x) = x - 5$

ÖRNEK *EXAMPLE*

$f(x) = 3x - 10$

$f^{-1}(x) = \frac{x + 10}{3}$

ÖRNEK *EXAMPLE*

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

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

ÖRNEK *EXAMPLE*

$f: R - \{a\} \to R - \{2\}$

$f(x) = \frac{kx + 1}{x - 5}$

fonksiyonu bire bir ve örten olduğuna göre, a·k = ?

Since the function is one-to-one and surjective, a. k =?

ÇÖZÜM *SOLUTION*

$a - 5 = 0, \quad a = 5$

$f^{-1}(x) = \frac{5x + 1}{x - k} \Rightarrow 2 - k = 0, \quad k = 2$

$a \cdot k = 5 \cdot 2 = 10$

ÖRNEK *EXAMPLE*

$x < -1$

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

$\Rightarrow f^{-1}(x) = ?$

ÇÖZÜM *SOLUTION*

Tam kare yapılır.

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

$y = (x + 1)^2 + 2$

$\sqrt{y - 1} = |x + 1|$

$-\sqrt{y - 1} = x + 1$

$x = -1 - \sqrt{y - 1}$

$y = -1 - \sqrt{x - 1}$ ve

$f^{-1}(x) = -1 - \sqrt{x - 1}$

Not (Note)

$f(x) \rightarrow$ **Tersi** *reverse* $f^{-1}(x)$ ise

$f(a) = b \Leftrightarrow f^{-1}(b) = a$

ÖRNEK *EXAMPLE*

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

$\Rightarrow$ **$f^{-1}(x)$ = ?**

ÇÖZÜM *SOLUTION*

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

ÖRNEK *EXAMPLE*

$f(x) = x - 5$

$\Rightarrow$ **$f^{-1}(2)$ = ?**

ÇÖZÜM *SOLUTION*

$f(x) = x - 5$

$f^{-1}(x - 5) = x$

$x = 7$ için; $f^{-1}(2) = 7$

ÖRNEK *EXAMPLE*

$f(x) = x - a$

$f^{-1}(3) = 5$

$\Rightarrow$ **a = ?**

ÇÖZÜM *SOLUTION*

$f^{-1}(2) = 5 \Rightarrow f(5) = 3 \Rightarrow f(5) = 5 - a = 3$

$a = 2$

ÖRNEK *EXAMPLE*

$f(2x - 3) = 5ax + 7$

$f^{-1}(2) = 5$

$\Rightarrow$ **a = ?**

ÇÖZÜM *SOLUTION*

$f^{-1}(2) = 5 \Rightarrow$

$f(5) = 2$

$2x - 3 = 5$

$x = 4$ için; $f(5) = 20a + 7 = 2$

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

ÖRNEK *EXAMPLE*

$f(x) = 3x - 5$

$\Rightarrow f(2) + f^{-1}(1) = ?$

ÇÖZÜM *SOLUTION*

$x = 2$ için; $f(2) = 1$ ve

$f(x) = 3x - 5 \Rightarrow f^{-1}(3x - 5) = x$

$x = 2$ için $f^{-1}(1) = 2$

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

ÖRNEK *EXAMPLE*

$f(x) = 3x - 2$

$\Rightarrow$ **f(x + 1) in f(x) cinsinden eşiti nedir?**

What is Fx+1 in terms of Fx?

ÇÖZÜM *SOLUTION*

$f(x) = 3x - 2 \Rightarrow f(x + 1) = 3(x + 1) - 2$

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

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

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

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

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

ÖRNEK *EXAMPLE*

$f(x) = 2^x$

$\Rightarrow f(2x)$ in $f(x)$ cinsinden eşiti nedir?

ÇÖZÜM *SOLUTION*

$f(x) = 2^x$

$f(2x) = 2^{2x} \Rightarrow f(2x) = (2^x)^2 = (f(x))^2$

ÖRNEK *EXAMPLE*

$f(x) = x - 1$

$g(x) = 2x + 3$

$f^{-1}(g(a)) = 5$

$\Rightarrow$ **a = ?**

ÇÖZÜM *SOLUTION*

$f^{-1}(g(a)) = 5 \Rightarrow f(5) = g(a)$ ve

$5 - 1 = 2a + 3$

$1 = 2a$

$a = \frac{1}{2}$

Sıra Sizde It Is Your Turn

1. $f(x) = \left(\frac{3x-1}{10}\right) = x$

$\Rightarrow$ **$f^{-1}(x)$ = ?**

2. $f(x) = 10x - 7$

$\Rightarrow$ **f(5) = ?**

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

$\Rightarrow$ **$f^{-1}(x)$ = ?**

4. $f(x) = 2x - b$, $f^{-1}(3) = 5$

$\Rightarrow$ **b = ?**

5. $f: R - \{3\} \to R - \{7\}$

$f(x) = \frac{7x-2}{x-3}$

$f^{-1}(a - 4) = 2$

$\Rightarrow$ **a = ?**

6. $f(2x - 7) = 5ax - 10$

$f^{-1}(5) = 3$

$\Rightarrow a = ?$

7. $f(x) = 3x - b$

$f^{-1}(5) = 3$

$\Rightarrow$ **f(4) = ?**

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

$\Rightarrow$ **$f(2) + f^{-1}(2)$ = ?**

9. $f(x) = 3x - 8$

$g(x) = 2x + 1$

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

$\Rightarrow$ **a = ?**

10. $f(x) = x - 5$

$\Rightarrow$ **f(3x) in f(x) cinsinden eşiti nedir?**

What is F3x in terms of Fx?

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

$\Rightarrow$ **f(x – 1) in f(x) cinsinden eşiti nedir?**

What is Fx-1 in terms of Fx?

12. $f(x) = 3^x$

$\Rightarrow$ **f(4x) in f(x) cinsinden eşiti nedir?**

What is F4x in terms of Fx?

13. $f: R - \{3\} \to R - \{a\}$

$f(x) = \frac{ax+b}{x-c}$

f(x) sabit fonksiyon

$\Rightarrow \frac{a}{b}$ **= ?**

Cevaplar Answer

1) $\frac{3x-1}{10}$ 2) 43 3) $\frac{-5x-4}{x-2} = f^{-1}(x)$

4) 7 5) – 8 6) $\frac{3}{5}$

7) 8 8) – 1 9) 0

10) 3f(x)+10 11) f(x)–3 12) $f^4(x)$

13) $-\frac{1}{3}$

Fonksiyonlarda Bileşke İşlemi — Simplifying and Expanding Rational Expressions

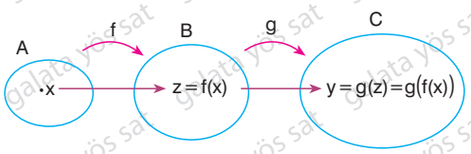
› $A,B,C \neq \varnothing$

$f: A \to B,\ f(x) = z,\ g: B \to C,\ g(z) = y$

ise, $g \circ f: A \to C, (g \circ f)(x) = g(f(x)) = y$

kuralı ile tanımlı fonksiyona f ile g nin bileşke fonksiyonu denir.

The function defined by the rule is called the composite function f and g.



Not (Note)

$(gof)(x) = g(f(x))$

Özellik — Feature

1) $f \circ f^{-1} = I = f^{-1} \circ f$ (I, birim fonksiyon) *Identity function*

2) $f \circ f = f = I \circ f$

3) $(f \circ g)^{-1} = g^{-1} \circ f^{-1}$

ÖRNEK *EXAMPLE*

$f(x) = 2x - 3$

$g(x) = x + 1$

$\Rightarrow$ **$(fog)(x) = ?$**

ÇÖZÜM *SOLUTION*

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

$= 2x - 1$

ÖRNEK *EXAMPLE*

$f(x) = x^2$

$g(x) = 3x - 2$

$\Rightarrow$ **$(gof)(x) = ?$**

ÇÖZÜM *SOLUTION*

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

ÖRNEK *EXAMPLE*

$f(x) = 2x + m,\ (f \circ f)(x) = 4x + 9$

$\Rightarrow$ **$f(2) = ?$**

ÇÖZÜM *SOLUTION*

$f(f(x)) = f(2x + m) = 2(2x + m) + m = 4x + 9$

$\Rightarrow 4x + 3m = 4x + 9$

$m = 3$

$f(x) = 2x + 3$

$f(2) = 7$

ÖRNEK *EXAMPLE*

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

$g(x) = x - 2$

$\Rightarrow$ **$f(\sqrt{7}) = ?$**

ÇÖZÜM *SOLUTION*

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

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

$f(x) = x^2$

$f(\sqrt{7}) = (\sqrt{7})^2 = 7$

ÖRNEK *EXAMPLE*

$f = \{(1, -2), (-3, 4), (7, 5)\}$

$g = \{(-2, 4), (4, 1), (5, 4)\}$

$\Rightarrow$ **$(fog)(4) + (gof)(7) = ?$**

ÇÖZÜM *SOLUTION*

$f(g(4)) + g(f(7))$

$= f(1) + g(5)$

$= -2 + 4 = 2$

ÖRNEK *EXAMPLE*

$$f(x) = \begin{cases} x^2 + 1, & x \geq 2 \\ 2x + 3, & x < 2 \end{cases}$$

$\Rightarrow$ **$(fofof)(-1) = ?$**

ÇÖZÜM *SOLUTION*

$f\big(\underbrace{f(f(-1))}_{1}\big) = f\big(\underbrace{f(1)}_{5}\big) = f(5) = 26$

ÖRNEK *EXAMPLE*

$f(x-1) = 2x-3$

$g(x+1) = 3x$

$\Rightarrow$ **(fogof)(0) = ?**

ÇÖZÜM *SOLUTION*

$f\big(g(f(0))\big) = f(g(-1)) = f(-6)$

$= -13$

ÖRNEK *EXAMPLE*

$f(x) = 4x+2,\ \ g(x) = -3x+1$

$(f \circ f^{-1})(2a+1) = (g \circ g)(0)$

$\Rightarrow$ **a = ?**

ÇÖZÜM *SOLUTION*

$2a+1 = g(g(0))$ $\qquad \left((fof)^{-1}(x) = I(x) = x \atop I(2a+1) = 2a+1\right)$

$2a+1 = g(1)$

$2a+1 = -2$

$a = -\dfrac{3}{2}$

ÖRNEK *EXAMPLE*

$(g \circ f)(x) = 5x+3$ ve $g(x) = 2x-4$

$\Rightarrow$ **f(x) = ?**

ÇÖZÜM *SOLUTION*

$g(f(x)) = 5x+3,\ \ g(f(x)) = 2f(x)-4$

$2f(x)-4 = 5x+3$

$f(x) = \dfrac{5x+7}{2}$

ÖRNEK *EXAMPLE*

$f(x) = 4x,\ \ g(x) = \dfrac{x}{2}\ ,\ (f^{-1} \circ g^{-1})(a) = 6$

$\Rightarrow$ **a = ?**

ÇÖZÜM *SOLUTION*

$(f^{-1} \circ g^{-1})(a) = 6$ $\qquad (f^{-1}og^{-1} = (gof)^{-1})$

$(g \circ f)^{-1}(a) = 6$

$(g \circ f)(6) = a$

$g(f(6)) = a$

$g(24) = a$

$12 = a$

Sıra Sizde It Is Your Turn

1. $f(x) = 3x-2,\ \ g(x) = x^2$

$\Rightarrow$ **(fog)(x) = ?**

2. $f(x) = x-2,\ \ g(x) = x+3,\ (g \circ f)(m) = 1$

$\Rightarrow$ **m = ?**

3. $f(x) = 5x-m,\ (f \circ f)(x) = 25x-18$

$\Rightarrow$ **m = ?**

4. $(f \circ g)(x) = (x-5)^2$

$g(x) = x-5$

$\Rightarrow$ **$f(\sqrt{3})$ = ?**

5. f: $\{(-1, 2), (2, 3), (3, 5)\}$

g: $\{(2, 4), (3, -1), (5, 1)\}$

$\Rightarrow$ **$(f \circ g)(3) + (g \circ f)(2)$ = ?**

6. $f(x) = \begin{cases} x^2-5 & , \quad x > 3 \\ 2x+1 & , \quad x \le 3 \end{cases}$

$\Rightarrow$ **$(f \circ f)(2)$ = ?**

7. $f(x) = 4x + 2, \quad g(x) = -x$

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

$\Rightarrow$ **a = ?**

8. $(g \circ f)(x) = 7x - 2, \quad g(x) = 3x + 1$

$\Rightarrow$ **f(x) = ?**

Cevaplar Answer

1) $3x^2 - 2$ 2) 0 3) 3 4) 3

5) 1 6) 20 7) $-\frac{5}{2}$ 8) $\frac{7x-3}{3}$

Permütasyon Fonksiyon Permutation Function

A sonlu bir küme olmak üzere;

A is a finite set;

f: A → A ya tanımlanabilecek bire bir her fonksiyona A'nın bir permütasyon fonksiyonu denir.

Each one-to-one function that can be defined in f: A ® A is called a permutation function of A.

ÖRNEK *EXAMPLE*

$A = \{1, 2, 3, 4\}$

$f: \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 1 & 4 & 2 \end{pmatrix}$ → Tanım kümesi, → Görüntü kümesi

$\Rightarrow$ **$f(2) + f^{-1}(4)$ = ?**

ÇÖZÜM *SOLUTION*

$f(1) = 3, \ f(2) = 1, \ f(3) = 4, \ f(4) = 2$

ve $f^{-1}(3) = 1, \ f^{-1}(1) = 2$

$f^{-1}(4) = 3, \ f^{-1}(2) = 4$

ÖRNEK *EXAMPLE*

$f: \begin{pmatrix} a & b & c & d \\ d & c & a & b \end{pmatrix}, \quad g: \begin{pmatrix} a & b & c & d \\ b & a & d & c \end{pmatrix}$

$\Rightarrow$ **$(g \circ f^{-1})(c)$ = ?**

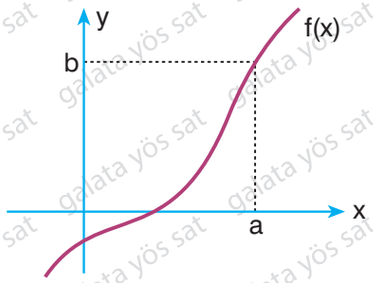
ÇÖZÜM *SOLUTION*

$g(f^{-1}(c)) = g(b) = a$

$(b) = c, \quad f^{-1}(c) = b$

Toplama Addition

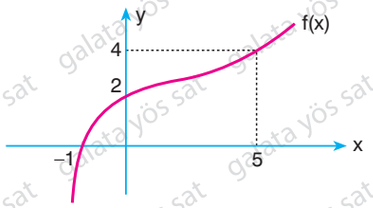
Fonksiyon Grafikleri



$f(a) = b$

$f^{-1}(b) = a$

ÖRNEK *EXAMPLE*



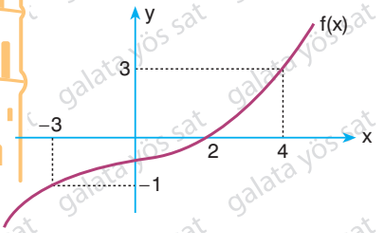
$\Rightarrow$ **f(0) + f(5) = ?**

ÇÖZÜM *SOLUTION*

$f(0) = 2$

$f(5) = 4 \quad \Rightarrow \ f(0) + f(5) = 6$

ÖRNEK *EXAMPLE*



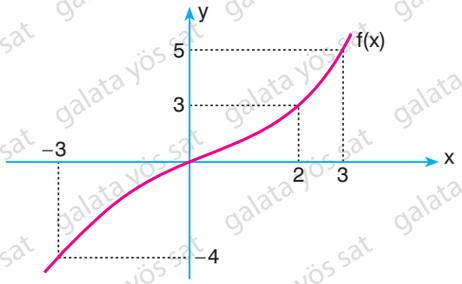
$\Rightarrow$ **$f(-3) + f^{-1}(3)$ = ?**

ÇÖZÜM *SOLUTION*

$f(-3) = -1, \quad f^{-1}(3) = 4$

$\Rightarrow (-1) + 4 = 3$

ÖRNEK *EXAMPLE*



$\Rightarrow \dfrac{f(2)}{f^{-1}(-4)} = ?$

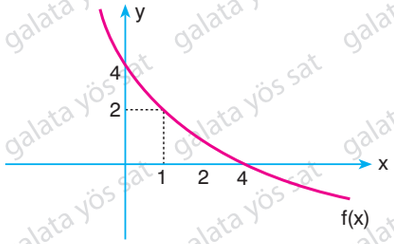
ÇÖZÜM *SOLUTION*

$f(2) = 3$

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

$\dfrac{f(2)}{f^{-1}(-4)} = \dfrac{3}{-3} = -1$

ÖRNEK *EXAMPLE*



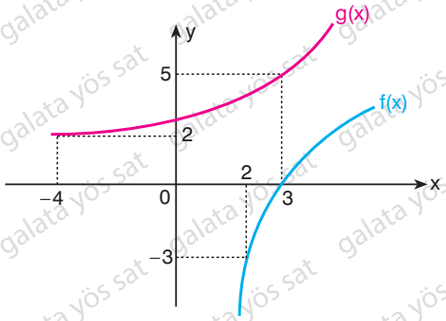
$\Rightarrow \dfrac{f(1) + f(0)}{f^{-1}(2)} = ?$

ÇÖZÜM *SOLUTION*

$f(1) = 2,\ f(0) = 4,\ f^{-1}(2) = 1$

$\Rightarrow \dfrac{f(1) + f(0)}{f^{-1}(2)} = \dfrac{2 + 4}{1} = 6$

ÖRNEK *EXAMPLE*



$\Rightarrow \dfrac{(fog^{-1})(5) + f^{-1}(-3)}{g^{-1}(2)} = ?$

ÇÖZÜM *SOLUTION*

$f(g^{-1}(5)) = f(3) = 0$

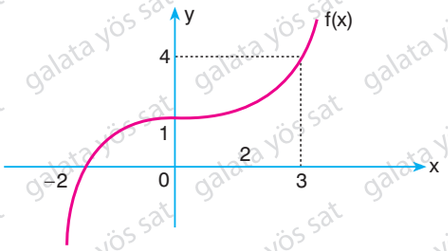
$f^{-1}(-3) = 2$

$g^{-1}(2) = -4$

$\Rightarrow \dfrac{0 + 2}{-4} = \dfrac{-1}{2}$

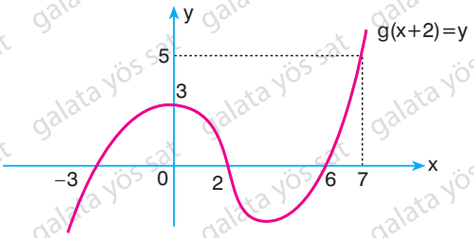
Sıra Sizde — It Is Your Turn

1.



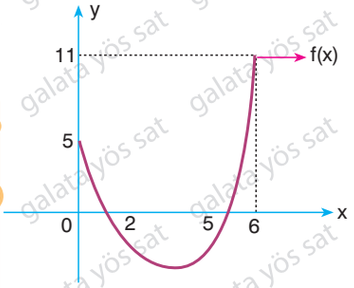
$\Rightarrow f(-2) + f(0) + f^{-1}(4) = ?$

2.



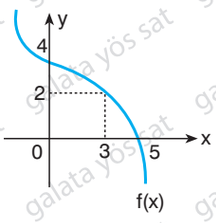
$\Rightarrow g(4) + g(9) = ?$

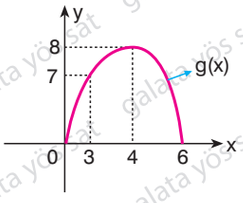
3.



$\Rightarrow f(7) + f(0) - f^{-1}(5) = ?$

4.





$\Rightarrow (gof)(0) + (fog^{-1})(7) = ?$

Cevaplar — Answer

1) 4 2) 5 3) 16 4) 10

1. $A = \{1, 2, 3\}$

$B = \{a, b\}$

I. $\{(1, a), (2, b), (3, a)\}$

II. $\{(1, a), (2, b)\}$

III. $\{(1, a), (1, b)\}$

hangisi A'dan B'ye tanımlı bir fonksiyondur?

which is a defined function from A to B?

A) Yalnız I B) Yalnız II C) Yalnız III

D) I ve II E) II ve III

2. $f: A \to B$

$f(x) = \dfrac{3x - 5}{x - 1}$

⇒ **A = ?**

A) R B) ∅ C) $R - \{1\}$

D) $R - \{3\}$ E) $R - \{-1\}$

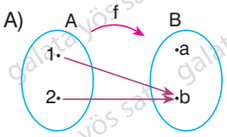
3. $A = \{1, 2\}$

$B = \{a, b\}$

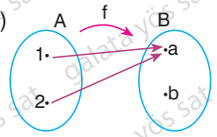
⇒ **hangisi A → B ye bir fonksiyon değildir?**

which is not a function , A → B?

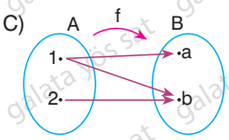
A)



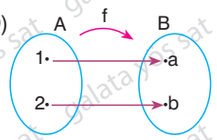
B)



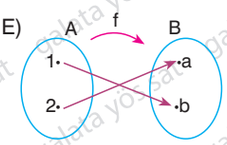
C)



D)



E)

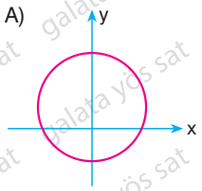


4. $f: R \to R$

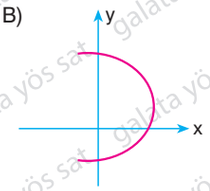
⇒ **hangisi bir fonksiyondur?**

which one is a function?

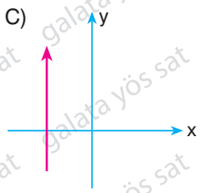
A)



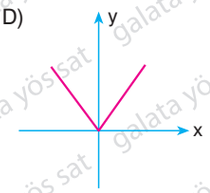
B)



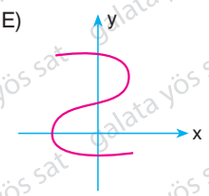
C)



D)



E)



5. $f(x) = \dfrac{x^2 - 1}{x - 3}$

⇒ **en geniş tanım kümesi aşağıdakilerden hangisidir?**

What is the largest set of domain?

A) R B) $R - \{1\}$ C) $R - \{-1\}$

D) $R - \{-3\}$ E) $R - \{3\}$

6. $f: R - \{a\} \to R$

$f(x) = \dfrac{5x - 2}{3x - 9}$

⇒ **a = ?**

A) −3 B) −1 C) 3 D) 1 E) 0

7. $f(x) = \sqrt{5 - x}$

⇒ **en geniş tanım kümesi nedir?**
what is the largest set of domain?

A) $(-\infty, 5)$ B) $(-\infty, 5]$ C) R
D) $[5, \infty)$ E) $(5, \infty)$

8. I. $f: R \to R$, $f(x) = 2x + 1$

II. $f: N \to N$, $f(x) = x + 2$

III. $f: Z \to Z$, $f(x) = 4x$

⇒ **fonksiyonlardan hangileri örtendir?**
Which of the functions are surjective?

A) Yalnız I B) I ve II C) I ve III
D) II ve III E) I, II ve III

9. **Hangisi içine fonksiyondur?**

Into function

A) $f: N \to N$, $f(x) = x$

B) $f: R \to R$, $f(x) = x^2 + 1$

C) $f: Z \to Z$, $f(x) = x + 2$

D) $f: R \to R$, $f(x) = x^5$

E) $f: R \to R$, $f(x) = 2x - 1$

10. $A = \{1,2, 3, 4, 5\}$, $f: A \to A$

kümesinde tanımlanabilecek bire bir fonksiyonların sayısı kaçtır?
What is the number of one-to-one functions that can be defined in the set?

A) 24 B) 60 C) 72 D) 90 E) 120

11. $f: R - \{a\} \to - \{b\}$

$f(x) = \dfrac{3x - 2}{x + 5}$

f(x) fonksiyonu bire bir ve örten olduğuna göre,
Since the function f (x) is one-to-one and surjective,

⇒ **m·n = ?**

A) –15 B) –5 C) –3 D) 3 E) 3

12. $f: A \to B$

$f(x) = x^2 + 5x + 7$

⇒ **En geniş A = ?** *The largest A ?*

A) ∅ B) $\{1, 5\}$ C) R
D) $\{5, 7\}$ E) $\{1, 5, 7\}$

13. $f: \{1, 2, 3\} \to B$

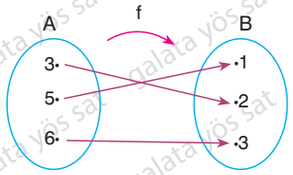
$f(x) = 3x - 1$

fonksiyonu örten olduğuna göre, B kümesinin elemanları çarpımı kaçtır?
What is the product of the elements of the set B, since it is a surjective the function?

A) 15 B) 16 C) 40 D) 80 E) 120

1-A 2-C 3-C 4-D 5-E 6-C 7-B 8-A 9-B 10-E 11-A 12-C 13-D

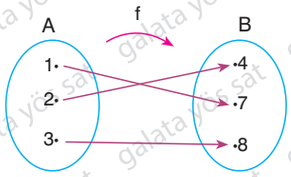
1.



⇒ **f(5) + f(3) + f(6) = ?**

A) 1 B) 2 C) 3 D) 4 E) 6

2.



⇒ **$f(2) + f^{-1}(7) = ?$**

A) 2 B) 5 C) 7 D) 11 E) 19

3. $f: \{-2, 0, 2, 4\} \to D$

$f(x) = \frac{x}{2}$, f örten fonksiyondur. *f is a surjective function.*

D kümesinin elemanları toplamı kaçtır?

What is the sum of the elements of the set D?

A) –2 B) –1 C) 0 D) 1 E) 2

4. $f(x) = x - 1$, $A = (-2, 1]$

⇒ **f(A) = ?**

A) $[-2, 1]$ B) $[-2, 1)$ C) $[-3, 0)$

D) $(-3, 0]$ E) $[0, 3]$

5. $f: \{1, 2, 3, 4\} \to B$

fonksiyonu bire bir ve içine fonksiyondur.

one-to-one and into function

⇒ **min(n(B)) = ?**

A) 3 B) 4 C) 5 D) 6 E) 7

6. **Hangisi R den R ye tanımlı bire bir fonksiyondur?**

Which is a one-to-one function defined from R to R?

A) $f(x) = x + 3$ B) $f(x) = x^2 + 2$ C) $f(x) = |x + 1| + 1$

D) $f(x) = x^2 + 3$ E) $f(x) = |x| + 3$

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

birim fonksiyonu olduğuna göre, f(a·b) = ?
Since it is an identity function, Fa.b

A) –1 B) 0 C) 1 D) 2 E) 3

8. $f(x) = (a-2)x^4 - (b+3)x^3 + (c-1)x + d - 5$

birim fonksiyon olduğuna göre, a + b + c + d = ?
Since it is an identity function, a+b+c+d

A) 6 B) 7 C) 8 D) 9 E) 10

9. f birim fonksiyondur. *f is an identity function*

$f(m + 1) + f(2m - 3) = 22$

⇒ **m = ?**

A) 3 B) 5 C) 8 D) 11 E) 20

10. $f(x) = (a + 3)x + 3a - 5$

sabit fonksiyon olduğuna göre, f(GALATA) = ?
Since it is a constant function, f GALATA

A) –20 B) –14 C) 3 D) 14 E) 20

11. $f(x) = (a-2)x^2 + (a+b)x + a - 2b$

sabit fonksiyonu olduğuna göre,
Since it is a constant function

f(1) + f(2) + ... + f(10) = ?

A) 6 B) 10 C) 30 D) 50 E) 60

12. f birim fonksiyon, g sabit fonksiyondur.
f is an identity function, g is a constant function

$f(x - 1) + g(3x + 5) = f(2x - 4) + g(x + 10)$

⇒ **x = ?**

A) –3 B) –2 C) 1 D) 3 E) 6

13. f(x) sabit fonksiyondur.
f (x) is a constunt function

$f(x) = \dfrac{8x + 24}{2x + (k - 2)}$

⇒ **k = ?**

A) 4 B) 6 C) 8 D) 12 E) 26

14. f(x) birim fonksiyon, g(x) sabit fonksiyondur.
f is an identity function, g is a constant function

$y = f(x)$, $g(x) = 5$

⇒ **(fog)(3) + (gof)(3) = ?**

A) 3 B) 5 C) 10 D) 9 E) 13

1-E 2-B 3-E 4-D 5-C 6-A 7-B 8-A 9-C 10-B 11-E 12-D 13-C 14-C

1. f doğrusal fonksiyondur. *f is a linear function.*

$f(1) = 5$

$f(2) = 7$

$\Rightarrow$ **f(– 3) = ?**

A) – 6 B) – 3 C) 0 D) 3 E) 6

2. f doğrusal fonksiyondur. *f is a linear function.*

$f(2) = 3$

$f^{-1}(9) = 5$

$\Rightarrow$ **f(4) = ?**

A) 2 B) 3 C) 5 D) 6 E) 7

3. f doğrusal fonksiyondur. *f is a linear function.*

$f(x) = (a - 2)x^2 - (b + 3)x + c - 5$

$f(a) = 12,\ f(1) = 2$

$\Rightarrow$ **c = ?**

A) – 3 B) – 1 C) 3 D) 5 E) 8

4. $f(x) = \sqrt{x + 7}$

$f(m - 2) = 3$

$\Rightarrow$ **m = ?**

A) – 4 B) – 2 C) 0 D) 2 E) 4

5. $f(x) = 2x + 1$

$\Rightarrow$ **f(1) + f(2) + f(3) = ?**

A) 3 B) 5 C) 7 D) 12 E) 15

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

$f(x + 1) + f(x - 2) = 12$

$\Rightarrow$ **x = ?**

A) 1 B) 3 C) 5 D) 7 E) 9

7. $f(x - 2) = 5x - 7$

$\Rightarrow$ **f(5) = ?**

A) 19 B) 23 C) 25 D) 28 E) 35

8. $f(x - 1) = 6x - 5$

$f(3) = a + 4$

$\Rightarrow$ **a = ?**

A) 5 B) 9 C) 15 D) 16 E) 21

9. $f(2x - 4) = 4x + 6,\ f(m - 1) = 10$

$\Rightarrow$ **m = ?**

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

10. $f(3x - 2) = x^3 + 5$

$\Rightarrow$ **f(4) = ?**

A) 2 B) 7 C) 13 D) 17 E) 25

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

$\Rightarrow$ **f(– 2) = ?**

A) -7 B) -4 C) 4 D) 7 E) 14

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

$\Rightarrow$ **$f\left(\frac{1}{2}\right)$ = ?**

A) 8 B) 6 C) 4 D) 2 E) 0

13. $f(x) = 3x - 1$

$\Rightarrow$ **f(2x + 1) = ?**

A) 6x B) 6x + 1 C) 2x + 6 D) 6x + 2 E) x + 2

14. $f(x - 1) = 2x + 1$

$\Rightarrow$ **f(4x + 3) = ?**

A) 9x + 1 B) 8x + 9 C) 9x + 8 D) x + 8 E) 9 + x

1-B 2-E 3-A 4-E 5-E 6-C 7-D 8-C 9-B 10-C 11-A 12-A 13-D 14-B

1. $f(x + 1) = 3x + 5$

$\Rightarrow$ **f(x) = ?**

A) $3x + 2$ B) $2x + 3$ C) $3x - 2$ D) $2x - 3$ E) $3x + 1$

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

$\Rightarrow$ **f(x) = ?**

A) $x - 2$ B) $x + 2$ C) $3x + 2$ D) $x + 3$ E) $x - 3$

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

$\Rightarrow$ **f(x) = ?**

A) $2 - 3x$ B) $3x$ C) $2 + 3x$ D) $3x - 2$ E) $3x + 2$

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

$\Rightarrow$ **f(x) = ?**

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

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

$\Rightarrow$ **f(2x – 1) = ?**

A) $4x - 1$ B) $4x - 7$ C) $7 - 4x$ D) $1 - 4x$ E) $7x + 4$

6. $f(3x) = 9x - 2$

$\Rightarrow$ **f(5x) = ?**

A) $2x$ B) $15x$ C) $2 - 15x$ D) $15x - 2$ E) $15x + 2$

7. $f(x) = 7x$

$\Rightarrow$ **$f^{-1}(x)$ = ?**

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

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

$\Rightarrow$ **$f^{-1}(x)$ = ?**

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

9. $f(x) = \frac{3x-1}{2x-5}$

$\Rightarrow f^{-1}(x) = ?$

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

10. $f(x+1) = 4x$

$\Rightarrow f^{-1}(x) = ?$

A) $4x+4$ B) $\frac{x-4}{4}$ C) $\frac{x+4}{4}$ D) $4x-4$ E) $4x-1$

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

$\Rightarrow f^{-1}(4x) = ?$

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

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

$\Rightarrow f^{-1}(2x) = ?$

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

13. $f(x-4) = 3x-1$

$\Rightarrow f^{-1}(2) = ?$

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

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

$\Rightarrow f^{-1}(-1) = ?$

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

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

$\Rightarrow f(10) = ?$

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

1-A 2-B 3-D 4-A 5-B 6-D 7-C 8-E 9-C 10-C 11-B 12-D 13-A 14-D 15-E

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

$g(x) = 4x - 1$

$\Rightarrow$ **(fog)(x) =?**

A) $12x + 2$ B) $12x - 2$ C) $20x + 2$ D) $15x - 2$ E) $15x + 2$

2. $f(x) = 2x + 1$

$g(x) = 5x - 3$

$\Rightarrow$ **(gof)(x) =?**

A) $10x - 2$ B) $10x + 2$ C) $5x + 2$ D) $2x + 3$ E) $19x - 5$

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

$g(2x) = 2x - 1$

$\Rightarrow$ **(gof)(x) =?**

A) $6x - 1$ B) $6x + 1$ C) $3x + 4$ D) $3x - 4$ E) $6x$

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

$g(x) = 4x + 5$

$\Rightarrow$ **(fog)(3x) =?**

A) $8x + 7$ B) $24x + 7$ C) $8x - 7$ D) $24x - 7$ E) $12x + 5$

5. $f(x) = 3x$

$g(x) = 2x - 1$

$\Rightarrow$ **(gof)(1) =?**

A) 3 B) 4 C) 5 D) 6 E) 7

6. $f(x) = 2x$

$g(x) = 3x$

$h(x) = 4x$

$\Rightarrow$ **(fogoh)(– 1) =?**

A) – 24 B) – 12 C) 12 D) 24 E) 48

7. $f(x) = x + 1$

f(2x) in f(x) cinsinden eşiti aşağıdakilerden hangisidir?

What is F2x in terms of Fx?

A) $2 \cdot f(x)$ B) $2 \cdot f(x) + 1$ C) $2 \cdot f(x) - 1$

D) $f(x) - 1$ E) $f(x) + 1$

8. $f(x) = 5 - x$

f(– x) in f(x) cinsinden eşiti aşağıdakilerden hangisidir?

What is F-x in terms of Fx?

A) $f(x) - 10$ B) $5 - f(x)$ C) $5 + f(x)$

D) $f(x) + 10$ E) $10 - f(x)$

9. $f(x) = 3^x$

f(2x) in f(x) cinsinden eşiti aşağıdakilerden hangisidir?

What is F2x in terms of Fx?

A) $\frac{f(x)}{2}$ B) $2 \cdot f(x)$ C) $[f(x)]^2$

D) 1 E) $\sqrt{f(x)}$

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

f(2x) in f(x) cinsinden eşiti aşağıdakilerden hangisidir?

What is F2x in terms of Fx?

A) $\frac{2 \cdot f(x) - 1}{f(x) - 3}$ B) $\frac{3 \cdot f(x) + 1}{f(x) + 3}$ C) $\frac{f(x) + 3}{3 \cdot f(x) + 1}$

D) $\frac{f(x) - 3}{2 \cdot f(x) - 1}$ E) $\frac{3 \cdot f(x) + 1}{f(x) - 3}$

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

f(2x) in f(x) cinsinden eşiti aşağıdakilerden hangisidir?

What is F2x in terms of Fx?

A) $f^2(x)$ B) $\sqrt{f(x)}$ C) $\frac{f(x)^2}{2}$

D) $2 \cdot f^2(x)$ E) $\frac{4}{3} f^2(x)$

12. $f(x + 2) = 3x$

$g(2x - 1) = 2x$

$\Rightarrow$ **(gof)(2x + 1) = ?**

A) $2x - 6$ B) $6x$ C) $6x + 2$

D) $6x - 2$ E) $2x$

1-A 2-B 3-D 4-B 5-C 6-A 7-C 8-E 9-C 10-B 11-D 12-D

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

$f(0) = 1$

$\Rightarrow$ **f(20) = ?**

A) 20 B) 21 C) 30 D) 40 E) 41

2. $f(2x) + f(x) = x + 1$

$f(1) = 4$

$\Rightarrow$ **f(16) = ?**

A) 3 B) 5 C) 9 D) 13 E) 17

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

$f(1) = 14$

$\Rightarrow$ **f(13) = ?**

A) 10 B) 20 C) 32 D) 40 E) 50

4. $f(x + 2) - f(x - 2) = x$

$f(1) = -2$

$\Rightarrow$ **f(21) = ?**

A) -57 B) -53 C) 43 D) 53 E) 57

5. $f(x - 1) + f(x + 1) + f(x + 3) = 5$

$f(1) = -1$

$\Rightarrow$ **f(7) = ?**

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

6. $f(x) = x \cdot f(x - 1)$

$f(1) = 72$

$\Rightarrow$ **f(7) = ?**

A) 132 B) 10! C) 11! D) 9! E) 143

7. $f(x) = 2x + 1$

$(fog)(x) = 4x + 1$

$\Rightarrow$ **g(x) = ?**

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

8. $f(x) = x + 1$

$g(x) = 2x - 5$

$\Rightarrow$ **$(fog)^{-1}(1)$ = ?**

A) $-\frac{5}{2}$ B) $-\frac{5}{4}$ C) 0 D) $\frac{5}{2}$ E) $\frac{5}{4}$

9. $f^{-1}(x) = 2x - 1$

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

$\Rightarrow$ **$(fog)^{-1}(2)$ = ?**

A) 2 B) 4 C) 5 D) 7 E) 9

10. $g(x) = x^2 + 5$

f(x) bire bir ve örten fonksiyon

f (x) is a one-to-one and Surjective function.

$\Rightarrow$ **$(gofof^{-1})(3)$ = ?**

A) 3 B) 8 C) 9 D) 11 E) 14

11. $f: R \to R$

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

$\Rightarrow$ **$f^{-1}(x)$ = ?**

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

12. $f(x) = x + 2$

$g(x) = x - 2$

$\Rightarrow$ **$(gogof)(x)$ = ?**

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

1-E 2-C 3-C 4-D 5-B 6-D 7-A 8-D 9-D 10-E 11-E 12-C

1. $f: \{(1, 3), (2, 5), (4, -1)\}$

$\Rightarrow \mathbf{f^{-1}(-1) + f(2) - f^{-1}(3) = ?}$

A) 10 B) 8 C) 6 D) 4 E) 1

2. $$f(x, y) = \begin{cases} \frac{x}{y} & ; \quad x + y \geq 1 \\ x \cdot y & ; \quad x + y < 1 \end{cases}$$

$\Rightarrow \mathbf{f\left(\frac{1}{3}, \frac{1}{2}\right) + f\left(\frac{7}{4}, \frac{3}{4}\right) = ?}$

A) $-\frac{15}{6}$ B) $-\frac{13}{6}$ C) $\frac{13}{6}$ D) $\frac{5}{2}$ E) 3

3. $f: \left(2, \frac{7}{3}\right) \rightarrow (m, n)$

$f(x) = 3x - 2$

fonksiyonu örten fonksiyondur. *Surjective function*

$\Rightarrow \mathbf{m \cdot n = ?}$

A) 9 B) 12 C) 15 D) 20 E) 21

4. $f(x) = x^2 - 6$

$f(a - 2) = 10$

$\Rightarrow \mathbf{\Sigma a = ?}$

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

5. $f(x) = \sqrt{x} + 1$

$\Rightarrow \mathbf{f^{-1}(x) = ?}$

A) $x^2 + 1$ B) $x^2 - 1$ C) $1 - x^2$

D) $x^2 - 2x + 1$ E) $x^2 + 2x + 1$

6. $(gof)(x) = 3x - 2$

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

$\Rightarrow \mathbf{g(x) = ?}$

A) $3x + 1$ B) $1 - 3x$ C) $3x$

D) $2 - 3x$ E) $2x - 1$

7. $f(x) = \frac{x-5}{2}$

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

$\Rightarrow$ **$(gof)^{-1}(3)$ = ?**

A) 11 B) 7 C) 21 D) 1 E) 0

8. $f(x) = 2x + 5$

$\Rightarrow$ **$f^{-1}(fofof^{-1})(3)$ = ?**

A) -1 B) 3 C) 5 D) 7 E) 11

9. $(g^{-1}of)^{-1}(x) = x$

$(x-3)\cdot f(x) + 2\cdot g(x) = 20$

$\Rightarrow$ **f(5) = ?**

A) 2 B) 4 C) 5 D) 8 E) 10

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

$\Rightarrow$ **$f(1)\cdot f(2)\cdot f(3)\cdot \ldots \cdot f(100)$ = ?**

A) $\frac{51}{52}$ B) $\frac{52}{53}$ C) $\frac{1}{51}$ D) $\frac{1}{52}$ E) $\frac{52}{51}$

11. $$f(x) = \begin{cases} 2x-1 & , \quad x > 3 \\ 3x+5 & , \quad 1 \le x \le 3 \\ x+a & , \quad x < 1 \end{cases}$$

$f(4) - f(2) + f(-3) = -5$

$\Rightarrow$ **f(a) = ?**

A) 2 B) 3 C) 4 D) 7 E) 11

12. $f = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 2 & 3 & 1 \end{pmatrix}$

$\Rightarrow$ **f^{-1} = ?**

A) $f^{-1} = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 3 & 2 & 4 \end{pmatrix}$ B) $f^{-1} = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 2 & 1 & 4 \end{pmatrix}$

C) $f^{-1} = \begin{pmatrix} 4 & 2 & 3 & 1 \\ 1 & 2 & 3 & 4 \end{pmatrix}$ D) $f^{-1} = \begin{pmatrix} 4 & 3 & 2 & 1 \\ 1 & 2 & 3 & 4 \end{pmatrix}$

E) $f^{-1} = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 2 & 3 & 1 \end{pmatrix}$

13. $f = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 3 & 1 & 5 & 4 \end{pmatrix}$

$g = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 4 & 1 & 2 & 5 & 3 \end{pmatrix}$

$\Rightarrow$ **$(gof^{-1})(3)$ = ?**

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

1-B 2-D 3-D 4-E 5-D 6-A 7-C 8-B 9-C 10-C 11-E 12-E 13-A

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

$\Rightarrow f(g^{-1}(4)) = ?$

A) 5 B) 7 C) 11 D) 13 E) 15

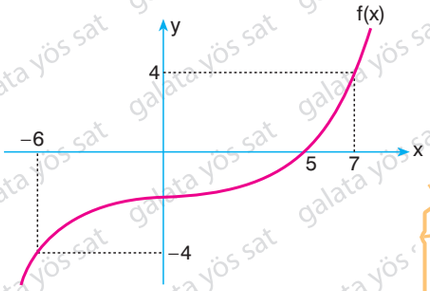
2. $f(x) = \dfrac{x^2 + 1}{x^3 - 4x}$

fonksiyonunu tanımsız yapan kaç farklı x gerçek sayısı vardır?

How many different real numbers x are there that make the function undefined?

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

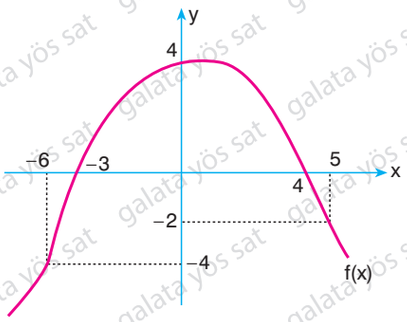
3.



$\Rightarrow f(5) + f^{-1}(4) + f^{-1}(-4) = ?$

A) 1 B) 6 C) 9 D) 11 E) 13

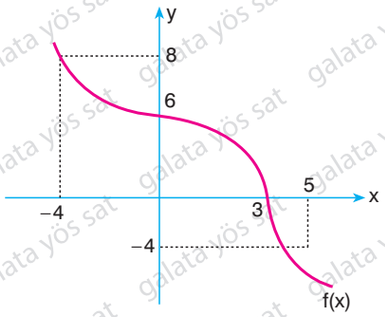
4.



$\Rightarrow f^{-1}(-4) - f(5) = ?$

A) −6 B) −4 C) 0 D) 4 E) 6

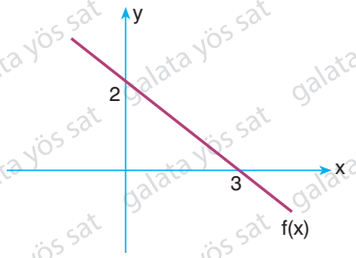
5.



$\Rightarrow f^{-1}(6) - f^{-1}(8) = ?$

A) −4 B) −1 C) 1 D) 4 E) 6

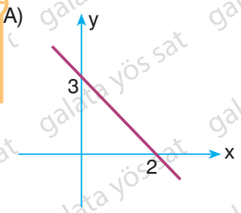
6.



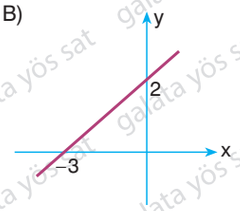
$f^{-1}(x)$ in grafiği aşağıdakilerden hangisidir?

Which of the following is the graph of $f^{-1}(x)$?

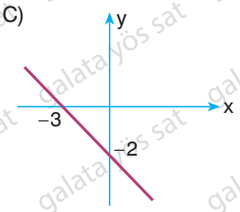
A)



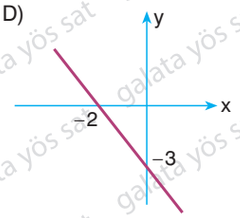
B)



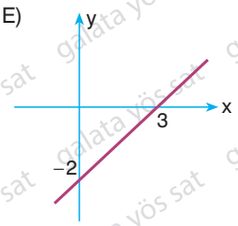
C)



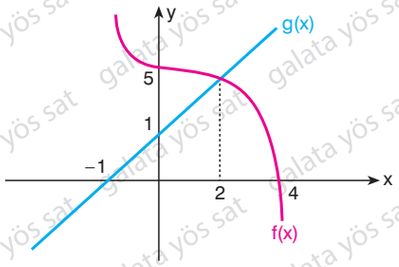
D)



E)



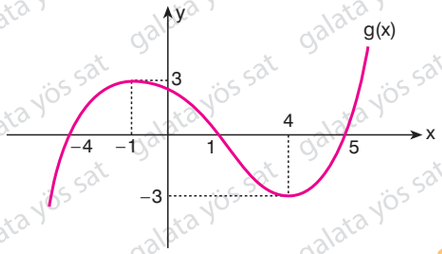
7.



$\Rightarrow \dfrac{g^{-1}(5) + f^{-1}(0)}{f(2)} = ?$

A) 1 B) $\frac{8}{3}$ C) 3 D) $\frac{11}{3}$ E) 5

8.



$\Rightarrow g(-1) - g^{-1}(-3) = ?$

A) –3 B) –2 C) –1 D) 0 E) 2

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

$f(1) = k$

$\Rightarrow$ **f(8) in k türünden değeri nedir?**

What is F8 in terms of k?

A) $\frac{k}{8}$ B) $\frac{k}{4}$ C) k D) k^4 E) k^8

10. $f(3^x) = 9^x + 3^{x-1} - 4$

$\Rightarrow$ **f(6) = ?**

A) 14 B) 22 C) 34 D) 38 E) 42

11. $f(ax^2 + bx - c) = 5x + 3$

$\Rightarrow$ **f(a – b – c) = ?**

A) –2 B) 0 C) 1 D) 2 E) 8

12. $f: R \to R$

$f(x) = (a - 5)x + b - 3$

fonksiyonunun görüntü kümesi tek elemanlıdır.

image set of function has a single element.

$f(7) + f(100) = 10$

$\Rightarrow$ **a · b = ?**

A) 5 B) 8 C) 13 D) 20 E) 40

1-D 2-C 3-A 4-B 5-D 6-A 7-B 8-C 9-E 10-C 11-A 12-E

1. $f(x) = \begin{cases} 3x - 9 , & x \geq 3 \\ x + 4 , & x < 3 \end{cases}$

f(x) – 3 = 0 şartını sağlayan x değerleri toplamı kaçtır?

What is the sum of x values that satisfy f (x) - 3 = 0?

A) – 1 B) 3 C) 4 D) 5 E) 7

2. $f(x+1) = \begin{cases} x + a , & x < 1 \\ 3x - 2 , & x \geq 1 \end{cases}$

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

⇒ **a = ?**

A) 12 B) 5 C) – 1 D) – 2 E) – 4

3. $A = \{-1, 3, 6\}$ kümesinden $B = \{7, 8, 9, 10\}$ kümesine tanımlanan

f: {(– 1, 7), (3, 10), (m, n)}

fonksiyonu bire birdir. *one to one function.*

⇒ **max(m + n) = ?**

A) 10 B) 13 C) 14 D) 15 E) 16

4. $f(x) = 2 \cdot g(x) - 3$

$g^{-1}(6) = 2$

⇒ **f(2) = ?**

A) 3 B) 5 C) 6 D) 9 E) 12

5. $f(1 - x) + f(x) = 21$

$f(1 + x) - f(x) = 7$

⇒ **f(x) + f(– x) = ?**

A) 14 B) 21 C) 24 D) 26 E) 28

6. $f(7x + 2) = 3x - 4$

⇒ $\mathbf{f^{-1}(5) = ?}$

A) 3 B) 5 C) 15 D) 21 E) 23

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

⇒ $\mathbf{f^{-1}(1) = ?}$

A) – 3 B) – 2 C) 0 D) 2 E) 5

8. $f^{-1}(x - 2) = g(2x + 1)$

⇒ **(fog)(5) = ?**

A) 0 B) 3 C) 5 D) 9 E) 11

9. $(fof)(5x - 17) = 4x + 3$

$\Rightarrow$ **(fof)(3) = ?**

A) 7 B) 11 C) 15 D) 19 E) 23

10. $f(x) = 3^{x-1}$

$\Rightarrow \dfrac{f(x+2)}{f(x+1)} = ?$

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

11. $f(x) = x + 1$

$\Rightarrow \underbrace{(fofofof\ldots f)}_{\text{10 tane}}(1) = ?$

A) 10 B) 11 C) 12 D) 13 E) 14

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

$\Rightarrow x^4 \cdot f\left(\dfrac{1}{x}\right) = ?$

A) $2x^4 + 5x^2 + 4x$ B) $2x^4 - 5x^2 - 4x$

C) $5x^2 - 2x^4 - 4x$ D) $4x^4 - 5x^2 + 2x$

E) $2x^4 - 5x^2 + 4x$

13. $f: R - \{1\} \to R - \{3\}$

$(fog)(x) = \dfrac{3g(x) + 3}{g(x) - 1}$

$f^{-1}(a) = 4$

$\Rightarrow$ **a =?**

A) 3 B) 5 C) 6 D) 8 E) 10

14. $\dfrac{f(x)}{f(3)} - \dfrac{4x}{3} = -2 \cdot f(x)$

$\Rightarrow$ **f(6) = ?**

A) 3 B) 4 C) 6 D) 9 E) 12

1-B 2-A 3-D 4-D 5-A 6-E 7-B 8-A 9-C 10-D 11-B 12-E 13-B 14-A

1. $4x^2 - xy + 2y - 2 = 0$

$\Rightarrow$ **y = f(x) = ?**

A) $\frac{4x^2 + 2}{x}$ B) $\frac{2 - 4x^2}{x - 2}$ C) $\frac{4x^2 - 2}{x - 2}$

D) $\frac{2x^2 - 4}{x - 2}$ E) $\frac{4 - 2x^2}{2 - x}$

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

$\Rightarrow$ **f(2) = ?**

A) $-\frac{9}{2}$ B) $-\frac{2}{9}$ C) 2 D) $\frac{9}{2}$ E) 9

3. f(x) birim fonksiyon ve *f (x) identity function*

$f(2x^2 - mx - n) = 2x^2 - 4x + 5$

$\Rightarrow$ **$f\left(\frac{m}{n}\right)$ = ?**

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

4. $f(3x - 5) = 4$

$\Rightarrow$ **3·f(100) + f(– 101) = ?**

A) 4 B) 8 C) 12 D) 16 E) 20

5. f: $\{(2, -1), (3, 4), (5, 7)\}$

g: $\{(1, 0), (3, 2), (5, 6)\}$

$\Rightarrow$ **$(f \cdot g)$ = ?**

A) $\{(2, 0), (3, 8)\}$

B) $\{(3, 8), (5, 42)\}$

C) $\{(2, 0), (3, 8), (5, 42)\}$

D) $\{(2, -2), (3, 8), (5, 0)\}$

E) $\{(2, 0), (3, 8), (5, 42)\}$

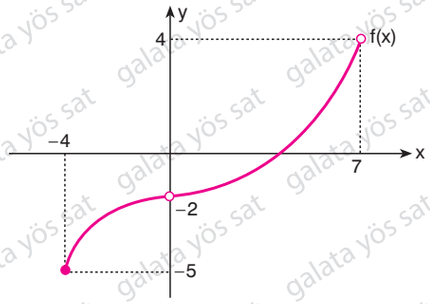
6. $f(3x) = \frac{1}{2 + 3x}$

$\Rightarrow$ **4·f(x) = ?**

A) $\frac{4}{2 + 3x}$ B) $\frac{4}{3x}$ C) $\frac{1}{2 + 4x}$

D) $\frac{4}{x + 2}$ E) $\frac{1}{x + 2}$

7.



f(x) in görüntü kümesi aşağıdakilerden hangidir?

Fx image?

A) R B) $[-5, 4]$ C) $[-4, 7)$

D) $[-5, 2)$ E) $[-5, 4) - \{-2\}$

8. $f(x) = ax^4 + bx^2 - x + 5$

$f(-2) = 4$

f(2) = ?

A) −1 B) 0 C) 1 D) 2 E) 5

9. $f: R - \{2\} \to R - \{3\}$

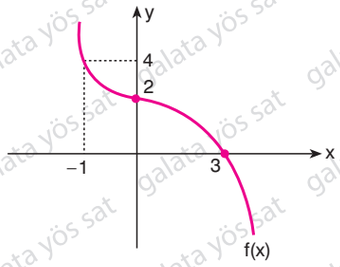
$$x = \frac{2 \cdot f(x) + 5}{f(x) - 3}$$

$\Rightarrow$ **$f^{-1}(x)$ = ?**

A) $\frac{5 - 2x}{x - 3}$ B) $\frac{2x + 5}{x + 3}$ C) $\frac{2x + 5}{x - 3}$

D) $\frac{3x + 5}{x - 2}$ E) $\frac{3x + 5}{x + 2}$

10.



$(f \circ f)(2x - 1) = 2$

$\Rightarrow$ **x = ?**

A) −1 B) 0 C) 1 D) 2 E) 3

11. $f(x) = 3^x$

27^9 'ın eşiti aşağıdakilerden hangisidir?

A) f(4) B) f(12) C) $f(f(4))$

D) $f(f(f(1)))$ E) $f(f(2))$

12. $f(x, y) = \max(x, 2y)$

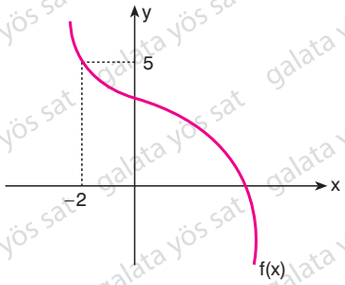
$g(x, y) = \min(2x, 5y)$

$\Rightarrow$ **$f[g(1, -1), f(1,3)]$ = ?**

A) −5 B) 6 C) 9 D) 10 E) 12

1-C 2-A 3-B 4-D 5-B 6-D 7-E 8-B 9-C 10-D 11-D 12-E

1.



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

⇒ **g(5) = ?**

A) – 11 B) – 5 C) 0 D) 5 E) 11

2. $f(x, y) = x^2 - y^2$

⇒ **f(a + b, a – b) = ?**

A) 0 B) $a \cdot b$ C) $\dfrac{a \cdot b}{4}$ D) $4a \cdot b$ E) $4a^2 + 4b^2$

3. f(x) bire bir ve örten fonksiyondur.

Fx is a one-to-one and surjective function.

$x = \dfrac{3 + f(x)}{2 \cdot f(x) - 1}$

⇒ **$f^{-1}(4)$ = ?**

A) – 1 B) 1 C) $\dfrac{3}{2}$ D) 2 E) $\dfrac{5}{2}$

4. $f: \{(2, 3), (3, – 4), (– 4, – 1), (7, 6)\}$

$f(3) = m$

⇒ **f(m) + f(7) = ?**

A) – 1 B) 0 C) 5 D) 7 E) 8

5. f birim fonksiyondur. *f identity function*

$f(k – 3) + f(3k + 2) = f(15)$

⇒ **k = ?**

A) 2 B) 4 C) 5 D) 7 E) 15

6. $A = \{– 1, 0, 1, c\}$

$f: A \to B$

$f(x) = 3x – 5$

$f(A) = \{– 5, – 2, – 8, 10\}$

⇒ **c = ?**

A) – 2 B) 2 C) 4 D) 5 E) 7

7. f doğrusal fonksiyondur.

f is a linear function.

$f(x – 1) + f(x) = 4x – 6$

⇒ **f(3) = ?**

A) – 2 B) 0 C) 4 D) 6 E) 8

8. $f: R - \{m\} \to R - \{n\}$

$$f(x) = \frac{6x - 7}{2x - 4}$$

$\Rightarrow$ **f(m + n) = ?**

A) $-\frac{7}{6}$ B) $-\frac{5}{6}$ C) $\frac{7}{6}$ D) $\frac{17}{6}$ E) $\frac{23}{6}$

9. f sabit fonksiyondur.

f is the constant function.

$$f(x) = x^{m-2} + (n - 3)x + m \cdot n$$

$\Rightarrow$ **f(m − n) =?**

A) −6 B) −3 C) 6 D) 7 E) 12

10. $f: R \to R$

$$f(x+1) = \begin{cases} 3x - 1, & x \text{ çift ise} \quad x \text{ even} \\ 2x + 5, & x \text{ tek ise} \quad x \text{ odd} \end{cases}$$

$\Rightarrow$ **f(2) + f(3) = ?**

A) 5 B) 6 C) 11 D) 12 E) 21

11. $f: R^+ \to R^+$

$$f^{-1}(x) = \sqrt{x^2 + 5x}$$

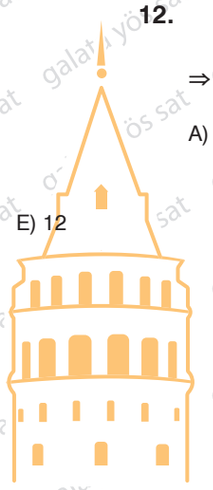
$\Rightarrow$ **f(6) = ?**

A) 1 B) 2 C) 4 D) 5 E) 6

12. $f(x^2 - 2x) = 3x^2 - 6x + 11$

$\Rightarrow$ **f(5) = ?**

A) −15 B) 15 C) 16 D) 21 E) 26



13. $f\left(\sqrt[3]{x - 1}\right) = 2x + 4$

$\Rightarrow$ **f(x) = ?**

A) $x^3 + 6$ B) $2x^3 + 6$ C) $x^3 - 6$ D) $2x^3 - 6$ E) $2x^3 + 4$

1-E 2-D 3-B 4-C 5-B 6-D 7-C 8-E 9-D 10-D 11-C 12-E 13-B

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

$\Rightarrow$ **f(x + 3) = ?**

A) $\frac{x^2+x-8}{x+3}$ B) $\frac{x^2-x-8}{x-3}$ C) $\frac{x^2+x+8}{x+3}$

D) $\frac{-x^2-x+8}{x+3}$ E) $\frac{x^2+x-8}{x-3}$

2. $f(x) = \sqrt{x-2} + \sqrt{3-x}$

en geniş tanım kümesi hangisidir?

What is the largest possible domain?

A) R B) (2, 3) C) $[-2, 3]$

D) $[2, -3]$ E) $[2, 3]$

3. $f: R \to R$

$$f(x) = \begin{cases} 3x - m & , \quad x < -1 \\ 2x + 1 & , \quad x \geq -1 \end{cases}$$

fonksiyonunun bire bir ve örten olması için "m" kaç olmalıdır?

How many should "m" be for the function to be one-to-one and surjective?

A) –4 B) –2 C) 0 D) 2 E) 4

4. $f\left(\frac{a}{b}\right) = f(a) - f(b)$

$f(36) = 10$

$\Rightarrow$ **f(6) = ?**

A) 5 B) 8 C) 10 D) 15 E) 20

5. $(fog)(x) = 4x$, $(g^{-1}oh)(x) = 3x + 5$

$\Rightarrow$ $\frac{f^{-1}(44)}{h(2)}$ **= ?**

A) –2 B) 2 C) 1 D) 6 E) 11

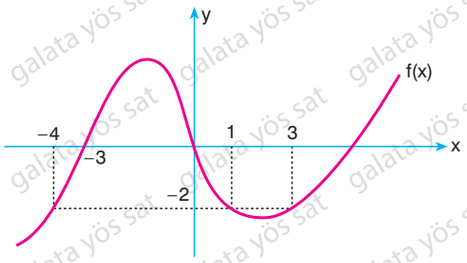
6. $f(x) = 2x - 1$

$(fog)(x) = g(x) + 5x$

$\Rightarrow$ **g(4) = ?**

A) 5 B) 15 C) 20 D) 21 E) 23

7.



$f(x - 1) = -2$

$\Rightarrow$ **Σx = ?**

A) –1 B) 1 C) 2 D) 3 E) 7

8. $3 \cdot f\left(\frac{x}{4}\right) = f\left(\frac{4}{x}\right) - 2x$

$\Rightarrow$ **$f\left(\frac{1}{4}\right) = ?$**

A) $-\frac{19}{4}$ B) $-\frac{11}{4}$ C) $\frac{4}{11}$ D) $\frac{4}{14}$ E) 1

9. $f(x) = (3x - 1) \cdot g(x - 3)$

$\Rightarrow$ **$\frac{f(2)}{g(-1)} + \frac{f(1)}{g(-2)} = ?$**

A) 2 B) 5 C) 7 D) 9 E) 11

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

$\Rightarrow$ **$f(3) = ?$**

A) 3 B) 9 C) 11 D) 16 E) 21

11. $f(3^{x+1} - 2) = x^2 - 5x + 3$

$\Rightarrow$ **$f(25) = ?$**

A) -3 B) -1 C) 7 D) 10 E) 12

12. $f: [3, \infty) \to [-4, \infty)$

$f(x) = x^2 - 6x + 5$

$\Rightarrow$ **$f^{-1}(x) = ?$**

A) $\sqrt{x+3} - 4$ B) $\sqrt{x+3} + 4$ C) $\sqrt{x-4} + 3$

D) $\sqrt{x+4} + 3$ E) $\sqrt{x+4} - 3$

13. $f: R \to R$

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

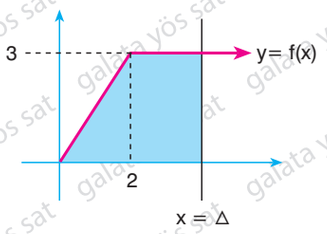
$\Rightarrow$ **$f(a + b + 2) = ?$**

A) $2 \cdot f(a) \cdot f(b)$ B) $4 \cdot f(a) \cdot f(b)$ C) $8 \cdot f(a) \cdot f(b)$

D) $\frac{f(a) \cdot f(b)}{4}$ E) $f(a) \cdot f(b)$

1-D 2-E 3-B 4-A 5-C 6-D 7-D 8-A 9-C 10-E 11-A 12-D 13-C

1.



f(Δ):"x = Δ doğrusunun solundaki alan" biçiminde tanımlanıyor.

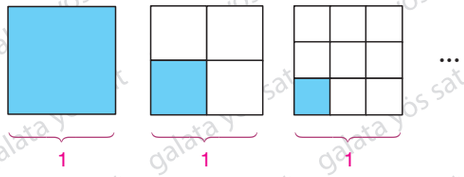
f (D): It is defined as "area to the left of the x = D line".

Örnek: f(4) = 9, f(2) = 3, f(6) = 15

olduğuna göre, f(7) – f(1) kaçtır?

A) 16,75 B) 17 C) 17,25 D) 17,5 E) 17,75

2.

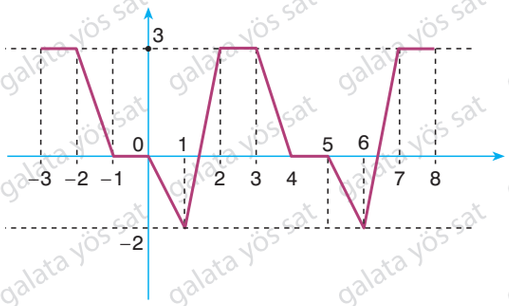


$f(1) = 1$ $f(2) = \frac{1}{4}$ $f(3) = \frac{1}{9}$ $\Rightarrow$

f(10) – f(9) kaçtır?

A) $\frac{-19}{8100}$ B) $\frac{19}{8100}$ C) $\frac{41}{8100}$ D) $\frac{-41}{8100}$ E) $\frac{37}{8100}$

3.



Yukarıdaki y = f(x)'in grafiğine göre

f(41) + f(–18) + f(103) kaça eşittir?

A) 10 B) 9 C) 8 D) 6 E) 4

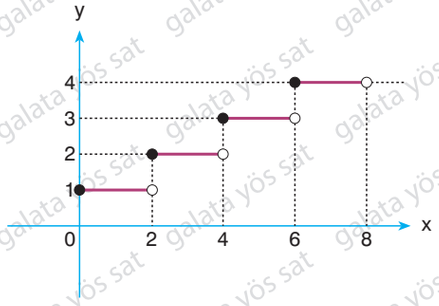
4.

$$f(x) = \begin{cases} x^2 & , \quad x = 3(\text{mod}4) \\ 2x+1 & , \quad x = 2(\text{mod}4) \\ x & , \quad x = 1(\text{mod}4) \\ -2x & , \quad x = 0(\text{mod}4) \end{cases}$$

f(–1) + f(5) + f(6) – f(8) = ?

A) 29 B) 31 C) 33 D) 35 E) 37

5.



Yukarıda $R^+ \cup \{0\} \rightarrow R$ tanımlı y = f(x)'in grafiği verilmiştir.

g(a): "y= f(x), x=a, x= a – 2 ve 0x ekseni arasındaki alan" biçimde tanımlanıyor.

Örneğin: g(4)= 4 , g(8)= 8'dir.

"y = f (x), x = a, x = area between a - 2 and 0x axis"

For example: g (4) = 4 is g (8) = 8

Buna göre, g(10) kaçtır?

A) 8 B) 9 C) 10 D) 11 E) 14

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