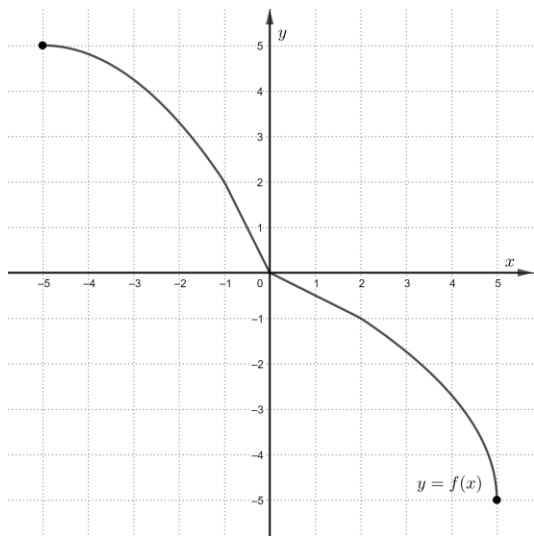


3. Functions

Illustration for tasks 3.1. – 3.4.



The illustration shows the graph of a function f .

Task 3.01. (0-1) (2015 – task 01)

The range of the function f belongs to the following interval:

- A. $\langle -1; 2 \rangle$ B. $\langle 0; 5 \rangle$ C. $\langle -5; 5 \rangle$ D. $\langle -5; 0 \rangle$

Task 3.02. (0-1) (2015 – task 02)

The zero of the function f is

- A. $x = -5$ B. $x = 0$ C. $x = 2$ D. $x = 5$

Task 3.03. (0-1) (2015 – task 03)

The set of solutions of inequality $f(x) \leq -1$ is the following interval:

- A. $\langle 2; 5 \rangle$ B. $\langle -5; 2 \rangle$ C. $\langle -5; 1 \rangle$ D. $\langle -1; 5 \rangle$

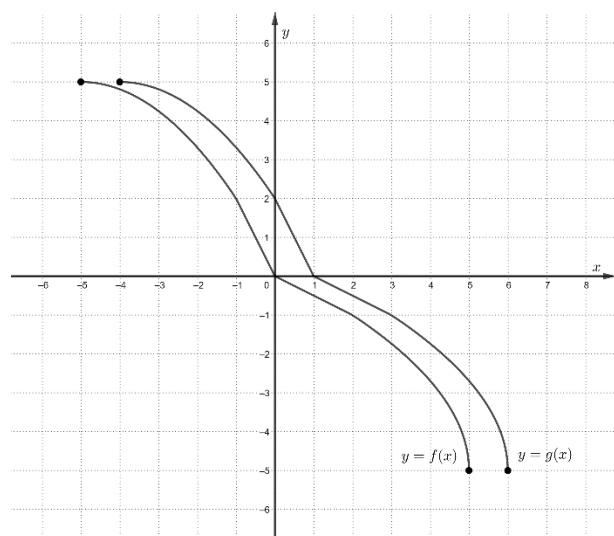
Task 3.04. (0-1) (2015 – task 04)

The graph of the function f is symmetrical about

- A. the OX axis B. the OY axis C. the origin D. the line $y = x$

3. Functions

Task 3.05. (0-1) (2015 – task 05)



The function g was plotted by translating the graph of the function f along one of the axes of the coordinate system (see illustration). The function g can be expressed in the following way:

- A. $g(x) = f(x) - 1$
- B. $g(x) = f(x + 1)$
- C. $g(x) = f(x - 1)$
- D. $g(x) = f(x) + 1$

Task 3.06. (0-3) (2015 – task 14)

Given the function f with the formula $f(x) = -x^2 - 2x + 3$, complete the following sentences.

- (a) The function f reaches the maximum value of for x equal to
- (b) The value of the function for $x = -5$ is the same as for another x equal to
- (c) The function f has negative values if, and only if, the x values belong to the set

Task 3.07. (0-1) (2016 – task 15)

The linear function $y = (3 - m)x + 6$ has no x -intercepts when

- A. $m = 3$
- B. $m = 0$
- C. $m = 6$
- D. $m = -3$

3. Functions

Task 3.08. (0-1) (2016 – task 06)

The quadratic function f takes negative values for all arguments in the $(-2, 3)$ interval and for no other arguments. The solution set for the inequality $f(x - 3) < 0$ is the interval

- A. $(-5; 0)$ B. $(1; 6)$ C. $(-2, 3)$ D. $(-3; 2)$

Task 3.09. (0-2) (2016 – task 18)

The linear function f has the equation $f(x) = -\frac{1}{2}x + 13$.

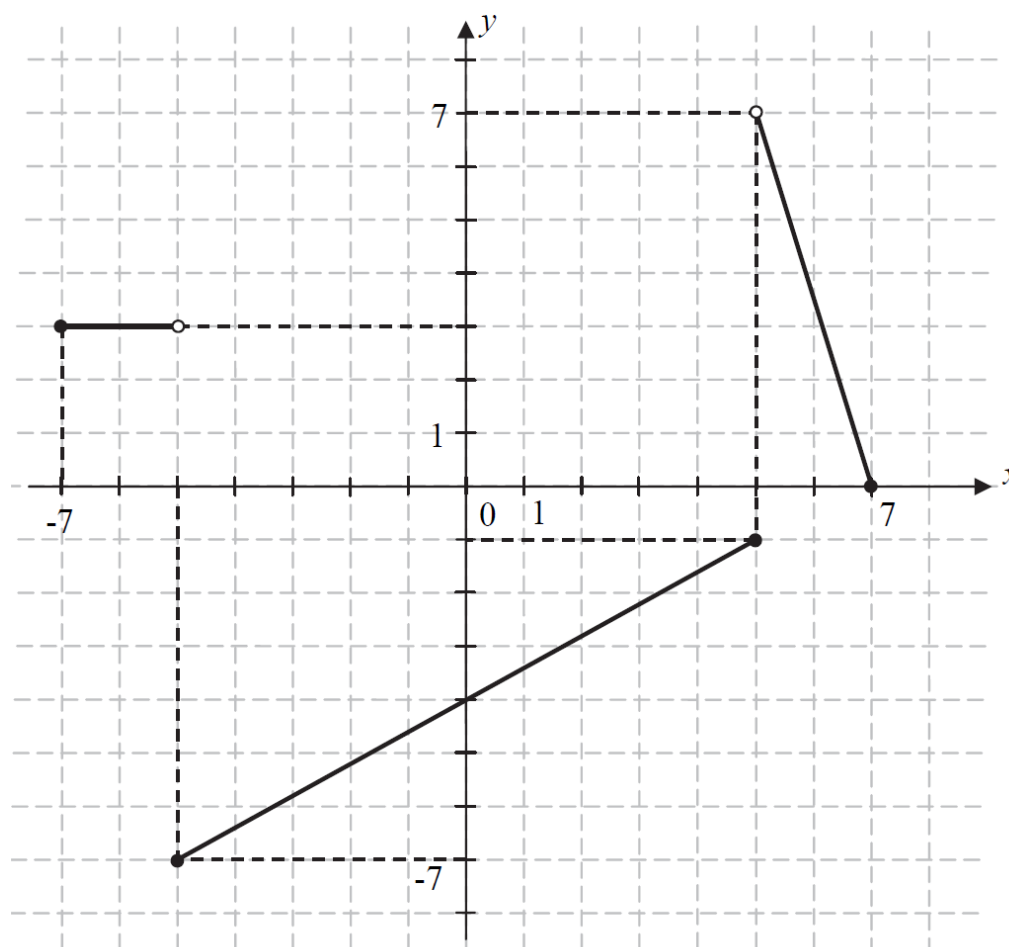
Complete the following sentences.

- (a) For the argument -4 , the value of the function f equals
- (b) The x -intercept of the function equals

3. Functions

Task 3.10. (0-5) (2016 – task 20)

The following illustration shows the graph of the function f .



Complete the following sentences based on the illustration.

- (a) The domain of the function is the set $D = \dots\dots\dots$
- (b) The range of the function is $Z_w = \dots\dots\dots$
- (c) The longest interval in which the function f decreases is $\dots\dots\dots$
- (d) The lowest value of the function f equals $\dots\dots\dots$
- (e) The solution set for the inequality $f(x) < -1$ is $\dots\dots\dots$

Task 3.11. (0-1) (2017 – task 06)

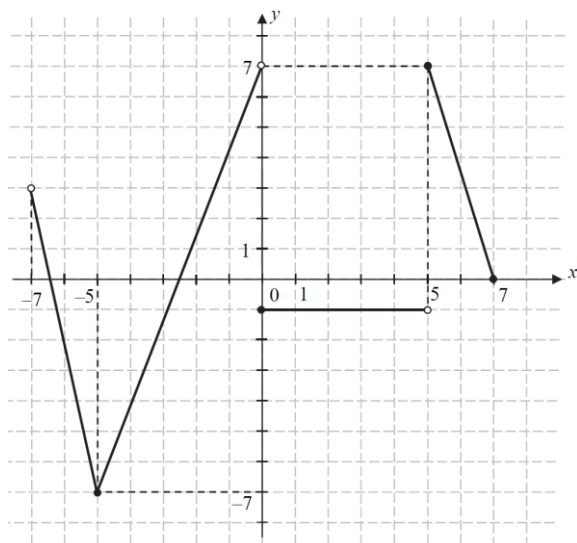
The graph of a linear function f is a line which crosses the axes of the coordinate system at $K = (-5, 0)$ and $L = (0, 7)$. Therefore, the equation of function f is:

- A. $f(x) = -\frac{7}{5}x + 7$
- B. $f(x) = \frac{7}{5}x + 7$
- C. $f(x) = \frac{5}{7}x - 5$
- D. $f(x) = -\frac{5}{7}x - 5$

3. Functions

Task 3.12. (0-5) (2017 – task 15)

The illustration shows the graph of a function f .



Complete the following sentences.

- The domain of function f is the set $D = \dots\dots\dots$
- The range of function f is $Z_w = \dots\dots\dots$
- The maximum of function f equals $\dots\dots\dots$
- The longest interval in which function f is increasing is $\dots\dots\dots$
- The number of x -intercepts of function f equals $\dots\dots\dots$

Task 3.13. (0-1) (2018 – task 05)

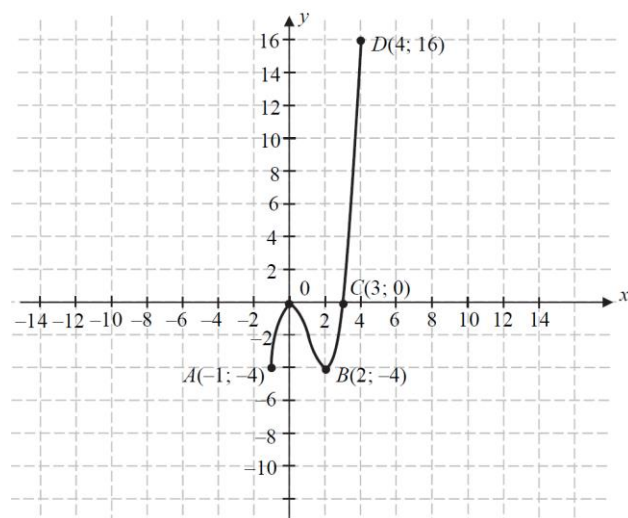
The exponential function f is given by the equation $f(x) = 2^x$. The graph of a function g is obtained by translating the graph of function f three units upwards along the axis OY . Hence, function g is defined by the equation

- | | |
|----------------------------|----------------------------|
| A. $g(x) = 2^{x+3}$ | B. $g(x) = 2^x + 3$ |
| C. $g(x) = 2^{x-3}$ | D. $g(x) = 2^x - 3$ |

3. Functions

Information for tasks 3.14 – 3.17.

The illustration shows the graph of a function f . It has two zeros which are both integers.



Task 3.14. (0-1) (2018 – task 06)

The domain of the function is the set:

- A. $\langle -1; 16 \rangle$ B. $\langle -4; 16 \rangle$ C. $\langle -1; 4 \rangle$ D. $\langle -1; 3 \rangle$

Task 3.15. (0-1) (2018 – task 07)

The range of the function f is the set:

- A. $\langle -1; 4 \rangle$ B. $\langle -1; 3 \rangle$ C. $\langle 0; 16 \rangle$ D. $\langle -4; 16 \rangle$

Task 3.16. (0-1) (2018 – task 08)

Function f reaches its minimum for:

- A. $x = 0$ and $x = 3$ B. $x = -1$ and $x = 2$
C. $x = -1$ and $x = -4$ D. $x = 2$ and $x = 4$

Task 3.17. (0-1) (2018 – task 09)

The zeros of the function f are the numbers

- A. 0 and 3 B. -1 and 2 C. -1 and -4 D. 2 and -4

3. Functions

Task 3.18. (0-3) (2018 – task 16)

A quadratic function f is given by the equation: $f(x) = 2x^2 - 8x - 10$. Complete the following sentences.

- (a) The interval in which the function is decreasing is
- (b) The range of the function is the interval:
- (c) The function assumes non-negative values if and only if the x arguments belong to the set

Task 3.19. (0-1) (2019 – task 04)

The quadratic function f takes positive values for all x within the interval $(-8,16)$ and for no other x . The solution set for the inequality $f(x + 4) > 0$ is the interval:

- A.** $(-12; 20)$ **B.** $(-4; 20)$ **C.** $(-4; 12)$ **D.** $(-12; 12)$

Task 3.20. (0-1) (2019 – task 05)

The four functions: f_1, f_2, f_3, f_4 are defined for all real numbers by the following formulas:

$$f_1(x) = x^2 - x + 2019, \quad f_2(x) = (x^2 + 2019)(x^2 + 1),$$

$$f_3(x) = -(x - 2019)(x^2 + 1), \quad f_4(x) = -x^2 + 11x - 2019$$

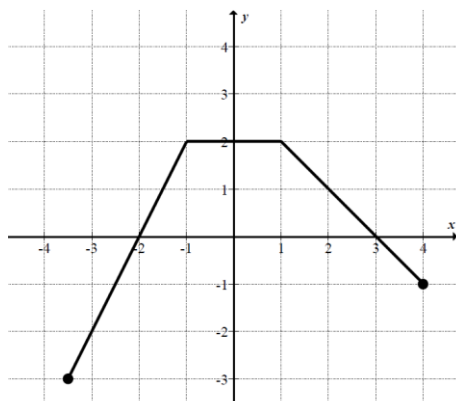
One of these functions has a zero. This function is:

- A.** f_1 **B.** f_2 **C.** f_3 **D.** f_4

3. Functions

Task 3.21. (0-1) (2020 – task 04)

The graph below shows function f .



Therefore,

- | | |
|------------------------------|------------------------------|
| A. $f(1) - 2 = f(0)$ | B. $f(0) - 2 = f(2)$ |
| C. $f(0) - 2 = f(-2)$ | D. $f(1) - 2 = f(-1)$ |

Task 3.22. (0-1) (2020 – task 10)

The function f is given by the formula $f(x) = \left(\frac{9}{4}\right)^x$ for each real number x .

For $x = -\frac{3}{2}$ the function f assumes the value of:

- | | | | |
|--------------------------|-------------------------|--------------------------|-------------------------|
| A. $\frac{27}{8}$ | B. $\frac{4}{9}$ | C. $\frac{8}{27}$ | D. $\frac{9}{4}$ |
|--------------------------|-------------------------|--------------------------|-------------------------|

Task 3.23. (0-3) (2020 – task 18)

The quadratic function f is given by the formula $f(x) = -2(x + 1)(x - 3)$.

Complete the following sentences.

- The axis of symmetry of the graph of the function f is a line given by the equation
.....
- The least value of the function f in the interval $\langle -1, 2 \rangle$ equals
.....
- The area of a triangle whose vertices are the points of intersection of the graph of the function f with the axes of the coordinate system equal
.....

3. Functions

Task 3.24. (0-1) (2021 – task 05)

The graph of the function $f(x) = (x + 6)(2x - 4)$ is a parabola whose vertex is a point with coordinates

- A. $(-6,4)$ B. $(6,-4)$ C. $(-6,2)$ D. $(-2,-32)$

Information for tasks 3.25 – 3.26

A function f assigns to each two-digit number x the remainder of the division of x by 7.

Task 3.25. (0-1) (2021 – task 06)

The set of values of the function f consists of

- A. 10 elements B. 90 elements C. 7 elements D. 13 elements

Task 3.26. (0-1) (2021 – task 07)

The number of zeros of the function f is equal to

- A. 10 elements B. 90 elements C. 7 elements D. 13 elements

Task 3.27. (0-1) (2021 – task 08)

The number of positive integers which belong to the set of values of the function $g(x) = -x^2 - 4x + 21$ is

- A. 10 B. 3 C. 25 D. 2