## 2. Algebraic expressions , equations, inequalities

### Task 2.1. (T 16.2015, 0 – 4 pts)

Write down each of the following as an algebraic expression.

a) the cube of the sum of $a$ and $b$.

.....

b) the difference of $a$ squared and $b$ squared ..... .

c) the quotient of the absolute value of $a$ doubled and $b$ ..... .

d) the cube root of the absolute value of the quotient of $a$ and $b$ ..... .

### Task 2.2. (T 4.2016)

If $m = \frac{1-x^2}{x+1}$, $n = x - 1$, where $x \neq -1$ then the difference between $m$ and $n$ equals

**A.** $0$ **B.** $2 - 2x$ **C.** $-2x$ **D.** $\frac{-x^2-x+2}{x+1}$

### Task 2.3. (T 19.2016, 0 – 2 pts)

The equation $mx^2 + 2x - 1 = 0$ is solved for $x$. Complete the following sentences.

a) If $m = -1$, then the number of solutions to this equation is ..... .

b) If the number $x_0 = \frac{1}{2}$ is the solution to this equation then $m =$..... .

### Task 2.4. (T 3.2017)

If $m = 5$ and $n = 4$ , then the difference of squares of $m$ and $n$ is:

**A.** 41 **B.** 1 **C.** 81 **D.** 9

### Task 2.5. (T 4.2017)

$\begin{cases} 2x + y = 3 \\ 4x - 5y = -1 \end{cases}$ is a system of equations which is represented in two-dimensional system of coordinates by:

**A.** an infinite set **B.** an empty set.

**C.** exactly two distinct points. **D.** exactly one point.

**Task 2.6. (T 5. 2017)**

The sum of all roots of the equation $(x - 3)(x - 2)(x + 6) = 0$ is:

**A.** $-1$ **B.** $1$ **C.** $-11$ **D.** $11$

**Task 2.7. (T 11.2018)**

The set of all real numbers $x$ which satisfy the inequality: $-3 < 2x - 1 < 3$ is

**A.** $(-3; 3)$ **B.** $\langle -3; 3 \rangle$ **C.** $(-1; 2)$ **D.** $\langle -1; 2 \rangle$

**Task 2.8. (T 2.2019)**

For each real number $x$ and for each real number $y$ the square of the difference $(x^2 - 5y)^2$ equals:

**A.** $x^4 - 10x^2y + 25y^2$ **B.** $-x^4 + 10x^2y - 25y^2$

**C.** $x^4 + 25y^2$ **D.** $x^4 - 25y^2$

**Task 2.9 (T 3.2019)**

The set of simultaneous equations $\begin{cases} 3x + 5y = -1 \\ x - 11y = 6 \end{cases}$ in a set of coordinate axes:

**A.** describes an infinite set. **B.** describes an empty set.

**C.** describes exactly two distinct points. **D.** describes exactly one point.

**Task 2.10 (T 2.2020)**

The product of all solutions of the equation $(x - 1)(x + 2)(x - 3) = 0$ is:

**A.** $-6$ **B.** $-2$ **C.** $2$ **D.** $6$

**Task 2.11 (T 3.2020)**

If $x + y = 25$ and $x - y = -4$, then $x^2 - y^2$ equals:

**A.** $-100$ **B.** $-29$ **C.** $29$ **D.** $100$

**Task 2.12. (T 8.2020)**

The expression $2(x - 3) - 5x\ (3 - x)$ can be written as:

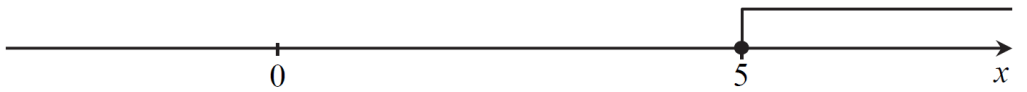
**A.** $-10x(x - 3)$ **B.** $10x(x - 3)$

**C.** $(5x - 2)(x - 3)$ **D.** $(5x + 2)(x - 3)$

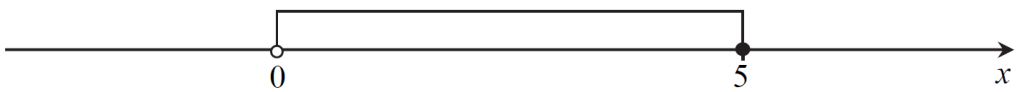
**Task 2.13. (T 9.2020)**

The solution set for the inequality $2 - \frac{2}{3}(x - 1) \geq -\frac{2}{3}$ is the interval:

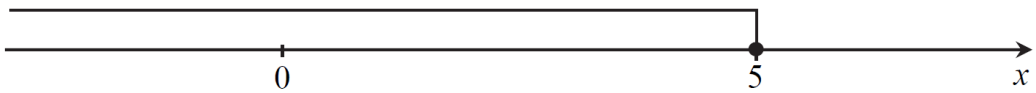
**A.**



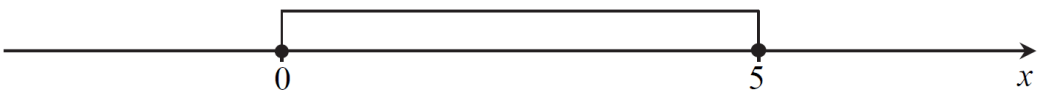

**B.**




**C.**




**D.**



**Task 2.14 (T 18.2020, 0 – 2 pts)**

The geometrical interpretation of the set of simultaneous equations

$$\begin{cases} x + y = 2 \\ x + (1 + m)y = 1 \end{cases}$$

with the unknowns $x$ and $y$ are:

a) two parallel lines, when $m$ equals ..... .

b) two perpendicular lines, when $m$ equals ..... .

**Task 2.15 (T 1.2021)**

The square of the difference of $3x$ and $y$, minus the square of the sum of $x$ and $3y$ is

**A.** $8x^2 + 8y^2 - 12xy$ **B.** $8x^2 - 8y^2$

**C.** $8x^2 - 8y^2 - 12xy$ **D.** $8x^2 + 8y^2$

**Task 2.16 (T 3.2021)**

The solution for the inequality

$$\frac{x-2}{2} - \frac{9-x}{3} > \frac{1}{6}x - 10$$

is

**A.** $(-9; +\infty)$ **B.** $\left(-\frac{36}{11}; +\infty\right)$ **C.** $\left(\frac{7}{2}; +\infty\right)$ **D.** $\boldsymbol{R}$

**Task 2.17. (T 4.2021)**

The greatest real root of the equation $x(x + 1)(3x + 4) = 0$ is

**A.** 1 **B.** 0 **C.** 2 **D.** $-\frac{4}{3}$

**Task 2.18 (T 3.2023)**

Complete the sentence. Select the correct answer from the options given below.

The number of all real solutions of the equation $x(x^2 + 1)(x - 2) = 0$ is

**A.** 1 **B.** 2 **C.** 3 **D.** 4