

MATHEMATICS

1. Let $z = 3 - 4i$. Then:

a) $|z| = 4$; b) $|z| = 5$; c) $|z| = 3$; d) $|z| = \sqrt{5}$.

2. Find $n \in \mathbb{N}$, $n \geq 2$, for which $C_n^2 = 10$.

a) $n = 3$; b) $n = 2$; c) $n = 5$; d) $n = 4$.

3. The identity element of the law of composition $x \star y = xy + 2x + 2y + 2$, with $x, y \in \mathbb{R}$, is:

a) $e = 0$; b) $e = 1$; c) $e = 2$; d) $e = -1$.

4. The solution of the equation $\log_2 x + \log_2(2x) = 5$ is:

a) $x = 2$; b) $x = 4$; c) $x = \pm 4$; d) $x = 1$.

5. Let $A = \begin{pmatrix} m & 0 & 1 \\ 0 & 3 & 1 \\ 2 & 1 & 1 \end{pmatrix}$. The value of the real parameter m for which the matrix A is not invertible is:

a) 1; b) 2; c) 3; d) 4.

6. If x_1, x_2, x_3 are the roots of the polynomial $f = x^3 - 3x + a$, with $a \in \mathbb{R}$, then $x_1^2 + x_2^2 + x_3^2$ equals:

a) 6; b) 3; c) 2; d) 1.

7. Let $f : (0, \infty) \rightarrow \mathbb{R}$, $f(x) = \frac{\ln x}{x+1}$. Then, $f'(1)$ is:

- a) 1; b) $\frac{1}{2}$; c) 2; d) 0.

8. Let $I = \int_0^1 x e^x dx$. Then:

- a) $I = 1$; b) $I = e$; c) $I = 0$; d) $I = -1$.

9. The function $f : \mathbb{R} \rightarrow \mathbb{R}$,

$$f(x) = \begin{cases} x^2 + 2x + 1, & \text{dacă } x \leq 1, \\ ax - 2, & \text{dacă } x > 1, \end{cases}$$

is continuous on \mathbb{R} for:

- a) $a = 2$; b) $a = -3$; c) $a = 6$; d) $a = 3$.

10. The value of the limit $L = \lim_{x \rightarrow \infty} (\sqrt{x^2 + 2x} - \sqrt{x^2 - 2x})$ is:

- a) $L = 0$; b) $L = 1$; c) $L = 2$; d) $L = \frac{1}{2}$.

11. Find the value of the real parameter m for which the function $f : \mathbb{R} \rightarrow \mathbb{R}$, $f(x) = x^3 + mx + 1$, attains a minimum at the point $x = 1$.

- a) 1; b) 3; c) -3; d) 2.

12. Determine the value of the real parameter m for which the line $y = mx$ is tangent to the graph of the function $f : (0, \infty) \rightarrow \mathbb{R}$, $f(x) = \ln x$.

- a) 1; b) $\frac{1}{e}$; c) 2; d) e .