



Mathematics – recommended time of processing: 45 minutes

- 1) The set of all solutions of the inequation  $\frac{3}{1-x} < 1$  in the domain  $\mathbb{R}$  is:
- $(-\infty, -2)$
  - $(-\infty, -2) \cup (1, +\infty)$
  - $(-2, 1)$
  - $(1, +\infty)$
  - none of the answers above is correct
- 2) The domain of the function  $y = \frac{\sqrt{1-x}}{\log(x-1)}$  is the set:
- $\emptyset$
  - $\{1\}$
  - $(-1, 1)$
  - $\mathbb{R} - \{1\}$
  - none of the answers above is correct
- 3) What is the standard deviation value if the variance is equal to 16:
- 2
  - 3
  - 4
  - 4.2
  - none of the answers above is correct
- 4) For an arithmetic sequence applies  $a_5 - a_1 = 12$ ,  $a_3 = 7$ . The  $a_{12}$  member is equal to the number:
- 34
  - 31
  - 27
  - 19
  - none of the answers above is correct
- 5) One root of the equation  $x^2 + 3\sqrt{n} \cdot x + n + 1 = 0$  is a double real root for:
- $n = 1$
  - $n = 4$
  - $n = 0$
  - $n = 4/5$
  - none of the answers above is correct
- 6) Decide which values  $x, y \in \mathbb{R}$  provide the solution of the given set of equations  
 $\log_{\frac{1}{3}} x - \log_{\frac{1}{3}} y = 0 \wedge y^2 - 2x - 3 = 0$ :
- $x = y = 0$
  - $x = y = 3$
  - $x = 0, y = 3$
  - $x = 3, y = 0$
  - none of the answers above is correct
- 7) The function  $y = -5 \cdot \frac{|x|}{x}$  is over the whole domain:
- even, increasing
  - even, decreasing
  - odd, increasing
  - odd, decreasing
  - none of the answers above is correct
- 8) The set of all solutions of the equation  $(1 - \cos x)(2 - \sin x) = 0$  is the set:
- $\{(2k + 1)\frac{\pi}{2}, k \in \mathbb{Z}\}$
  - $\{k\pi, k \in \mathbb{Z}\}$
  - $\{2k\pi, k \in \mathbb{Z}\}$
  - $\{(2k + 1)\pi, k \in \mathbb{Z}\}$
  - none of the answers above is correct
- 9) The table shows the distribution of students' performance in Biology. Calculate the percentage of students who successfully passed the course (grade 5 means Failed).
- | Grade            | 1 | 2 | 3  | 4 | 5 |
|------------------|---|---|----|---|---|
| Number of pupils | 4 | 8 | 12 | 3 | 3 |
- 20%
  - 10%
  - 90%
  - 30%
  - none of the answers above is correct
- 10) The straight lines  $p: 3x + 4y - 2 = 0$  and  $q: 8x - 6y + 4 = 0$  are closing an angle of size:
- $\pi/6$
  - $\pi/3$
  - $\pi/2$
  - $2\pi/3$
  - none of the answers above is correct

11) All real solutions of the equation  $4^{x+3} - 4^x = 63$  belong to the interval:

- a)  $\langle -1, 0 \rangle$
- b)  $\langle 0, 1 \rangle$
- c)  $\langle 1, 2 \rangle$
- d)  $\langle 2, 4 \rangle$
- e) none of the answers above is correct

12) Define the number  $y \in \mathbb{R}$  such, that the point  $A = [2, y]$  is situated on the straight line which is parallel with the line  $y = 4x + 5$  and is passing the point  $B = [1, 4]$ :

- a)  $y = 4$
- b)  $y = 8$
- c)  $y = 9$
- d)  $y = 13$
- e) none of the answers above is correct

13) The negation of a statement "At least one dog does not bite" is the statement:

- a) One dog bites.
- b) All dogs do not bite.
- c) More than one dog bite.
- d) All dogs bite.
- e) none of the answers above is correct

14) Consider the following sample of  $n = 7$  measurements: 5, 7, 4, 5, 20, 6, 2. The median of this sample is:

- a) 5
- b) 4
- c) 4.5
- d) 20
- e) none of the answers above is correct

15) The equation  $\log_3(27x) + \log_3(x^2) = 15$  has one root only, that is situated within the interval:

- a) (71, 83)
- b) (49, 57)
- c) (27, 50)
- d) (3, 15)
- e) none of the answers above is correct

16) The number of all real solutions of the equation

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

- a) 1
- b) 2
- c) 3
- d) 0
- e) none of the answers above is correct

17) Calculate the value of the expression  $\frac{3 \sin x + \cos x}{\cos x - 3 \sin x}$ , if

the  $\cot x = 1$ :

- a) 0
- b) 1
- c) 2
- d) -2
- e) none of the answers above is correct

18) What is the probability of obtaining the same number fallen when rolling two dice?

- a)  $\frac{1}{12}$
- b)  $\frac{1}{6}$
- c)  $\frac{5}{12}$
- d)  $\frac{5}{36}$
- e) none of the given answers is correct

19) For every  $x \geq 0$  the expression  $\sqrt{x \cdot \sqrt[3]{\sqrt{x}}}$  is equal to:

- a)  $x^{\frac{7}{6}}$
- b)  $x^{\frac{5}{6}}$
- c)  $x^{\frac{7}{12}}$
- d)  $x^{\frac{3}{2}}$
- e) none of the answers above is correct

20) The table shows the distribution of students' performance in Biology. Calculate the mode of the variable Grade.

Grade	1	2	3	4	5
Number of pupils	4	8	12	3	3

- a) 1
- b) 3
- c) 4
- d) 5
- e) none of the answers above is correct