ENTRANCE EXAM IN MATHEMATICS
University of Belgrade, Faculty of Mechanical Engineering
(study programme ME)
June 25, 2026

Question set: 1

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1. The expression $(2^0 + 2^{0,5})^{-1} + 2^0 - 2^{0,5}$ is identically equal to:
   (A) 0; (B) 2; (C) $-\frac{1}{\sqrt{2}}$; (D) $3 - \sqrt{2}$; (E) $\frac{5}{2} - 2\sqrt{2}$; (N) I don't know.

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2. The sum of the minimum and the maximum of function $f(x) = x^2 - 2x + 3$ on segment $[0, 3]$ equals:
   (A) 5; (B) 4; (C) 1; (D) 8; (E) 9; (N) I don't know.

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3. The sum of the solutions of the equation $x^2 - 2|x| - 3 = 0$ is:
   (A) 1; (B) 0; (C) -3; (D) 2; (E) -1; (N) I don't know.

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4. The set of all real solutions of the inequality $\frac{x^2 - 2}{x^2 - x - 2} \geqslant \frac{1}{2}$ is:
   (A) $(-\infty, -2] \cup [1, +\infty)$; (B) $(-\infty, -2) \cup (-1, 1) \cup (2, +\infty)$;
   (C) $(-\infty, -2] \cup (-1, 1] \cup [2, +\infty)$; (D) $(-\infty, -2] \cup (2, +\infty)$;
   (E) $(-\infty, -2] \cup (-1, 1] \cup (2, +\infty)$; (N) I don't know.

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5. If $f(x) = \sqrt{x}$ and $g(x) = \log_{1/2} x$, then $g\left(f\left(\frac{1}{2}\right)\right)$ is equal to:
   (A) -2; (B) $-\frac{1}{2}$; (C) 1; (D) $\frac{1}{2}$; (E) 2; (N) I don't know.

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6. The domain of the function $f(x) = \sqrt{\frac{1+x}{2-x}}$ is:
   (A) $(-1, 2)$; (B) $[-1, 2]$; (C) $[-1, 2)$; (D) $(-\infty, -1] \cup [2, \infty)$;
   (E) $(-\infty, -1] \cup (2, \infty)$; (N) I don't know.

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7. If the polynomial $x^4 + ax^2 + b$ $(a, b \in \mathbb{R})$ is divisible by $x^2 + x + 1$, then $a + b$ is equal to:
   (A) -1; (B) 2; (C) 0; (D) 1; (E) -2; (N) I don't know.

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8. If the equation $\left(1/\sqrt{3}\right)^{x-x^2} = 9$ has exactly m positive and n negative solutions, then:
   (A) $m = 2$, $n = 0$; (B) $m = 0$, $n = 2$; (C) $m = n = 1$; (D) $m = 1$, $n = 0$;
   (E) $m = 0$, $n = 1$; (N) I don't know.

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9. The solution of the equation $\log_4(x-2) + \log_{16}(x-2) + \log_2(x-2) = 7$ lies in the interval:
   (A) $[0, 5]$; (B) $[5, 10]$; (C) $[10, 15]$; (D) [15,20]; (E) [20,25]; (N) I don't know.

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10. The sum of the real and imaginary parts of the complex number $\frac{-6 - 2i}{(1 - i)^3}$ is:
    (A) -2; (B) 1; (C) 0; (D) -1; (E) 2; (N) I don't know.

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11. The real part of the solution of equation $|z| + z = 2 + i$ is:

(A) $\frac{3}{4}$; (B) $\frac{4}{3}$; (C) 1; (D) 2; (E) $\frac{5}{4}$; (N) I don't know.

12. If $0 < x < \pi/2$ and $\operatorname{tg} 2x = -2$, then $\tan x$ equals:

(A) $\frac{\sqrt{5}-1}{2}$; (B) $\frac{1+\sqrt{5}}{2}$; (C) 1; (D) $2+\sqrt{5}$; (E) $\frac{2}{3}$; (N) I don't know.

13. What is $\dfrac{1}{\sin 10^\circ} - 4\sin 70^\circ$?

(A) 4; (B) -2; (C) 1; (D) $\sqrt{3}$; (E) 2; (N) I don't know.

14. The sum of the four smallest positive solutions of the equation $\sin 4x \cos 6x = 0$ is:

(A) $\frac{3}{4}\pi$; (B) $\frac{9}{8}\pi$; (C) π; (D) $\frac{4}{3}\pi$; (E) $\frac{5}{4}\pi$; (N) I don't know.

15. In a right triangle, the hypotenuse is 5 and the radius of the inscribed circle is 1. Then its sum of legs equals:

(A) 7; (B) 6; (C) $5\sqrt{2}$; (D) $1+2\sqrt{6}$; (E) $2+\sqrt{21}$; (N) I don't know.

16. A regular hexagonal prism $ABCDEFA_1B_1C_1D_1E_1F_1$ has all edges equal to a. The area of quadrilateral ABD_1E_1 is:

(A) $2a^2$; (B) $3a^2$; (C) $a^2\sqrt{3}$; (D) a^2; (E) $2a^2\sqrt{2}$; (N) I don't know.

17. Developing the lateral surface of a cone in the plane yields a quarter of a circle of radius $4\sqrt{5}$. The volume of this cone equals:

(A) $\dfrac{100\pi}{\sqrt{3}}$; (B) $\dfrac{25\pi\sqrt{2}}{3}$; (C) $\dfrac{20\pi\sqrt{5}}{3}$; (D) $\dfrac{25\pi\sqrt{3}}{3}$; (E) $\dfrac{50\pi\sqrt{3}}{3}$; (N) I don't know.

18. The sum of the x- and y-coordinates of the center of the circle given by the equation $x^2 + y^2 - 6x - 14y + \frac{521}{9} = 0$ is:

(A) 10; (B) 13; (C) 11; (D) 20; (E) 17; (N) I don't know.

19. The sum of the third and sixth terms of an arithmetic sequence is 16, and the sum of the fifth and seventh terms is 22. The twentieth term of this sequence is:

(A) 36; (B) 38; (C) 39; (D) 41; (E) 45; (N) I don't know.

20. How many five-digit positive integers are there in whose decimal representation there are exactly two zeros?

(A) 2916; (B) 3024; (C) 4374; (D) 5040; (E) 7290; (N) I don't know.