

# TEST ON MATHEMATICS

1. How many integers satisfy the inequality:  $x \cdot \log_3 x - 3 + \log_{\sqrt[3]{3}} x - x \leq 0$ .

A. 3; B. 4; C. 6; D. 7.

Answer: A.

2. How many four-digit natural numbers exist with following conditions: they do not use 0, all digits of every such number are different and every such number uses at least one odd digit and at least one even digit?

A. 480; B. 2880; C. 2160; D. 1920.

Answer: B.

3. Find smallest non-negative root of the equation:  $\frac{\sin 2x}{\sin x} + \frac{\cos 2x}{\cos x} = 3$ .

A. 0; B.  $\arccos \frac{1}{4}$ ; C.  $\arccos(-\frac{1}{4})$ ; D.  $\frac{\pi}{2}$ .

Answer: C.

4. A cone is inscribed in a sphere of radius  $\frac{3}{2}$ . What is the height of such cone with the largest volume?

A.  $\frac{4\pi}{3}$ ; B. 2; C.  $\sqrt{3}$ ; D.  $\frac{2\pi}{3}$ .

Answer: B.

5. Two points are moving by the X-axis from the time moment  $t = 0$ . The first point starts from the coordinate 10 and its speed is changing according to the formula:  $v_1(t) = 5 + 24t - 3t^2$ . The coordinate of the second point changes according to the formula:  $x_2(t) = 154 - 31t + 8t^2$ . At what moment of time these points will meet for the first time?

A. -6; B. 4; C. 6; D. They will never meet.

Answer: B.

6. There is an infinite sequence of squares such that vertices of every next square lie in the centers of the sides of the previous square. Odd-numbered squares are filled with white color, and even-numbered are filled with black. Find the black area fraction of the first square.

A.  $\frac{1}{3}$ ; B.  $\frac{2}{3}$ ; C.  $\frac{3}{4}$ ; D.  $\frac{1}{2}$ .

Answer: A.