

MATHEMATICS

1. If A is a non-singular matrix and $(A - 2I)(A - 4I) = [0]$, then $\frac{1}{6}A + \frac{4}{3}A^{-1}$ is
A) $[0]$ B) I C) $2I$ D) $6I$
2. The amplitude of the complex number $Z = \frac{-1+i\sqrt{3}}{2}$ is
A) $\frac{\pi}{6}$ B) $\frac{\pi}{3}$ C) $\frac{2\pi}{3}$ D) $\frac{4\pi}{3}$
3. The eccentricity of ellipse $4x^2 + 9y^2 - 16x = 20$ is
A) $\frac{\sqrt{5}}{3}$ B) $\frac{2}{3}$ C) $\frac{1}{3}$ D) $\frac{4}{3}$
4. If \bar{a} and \bar{b} are unit vectors and θ is the angle between \bar{a} and \bar{b} then $\sin \frac{\theta}{2}$ is equal to
A) 1 B) $\frac{1}{2}|\bar{a} - \bar{b}|$ C) 0 D) $\frac{1}{2}|\bar{a} + \bar{b}|$
5. The image of the point $(1, 2, 4)$ in the plane $2x - y + z + 2 = 0$ is
A) $(-3, 4, 2)$ B) $(3, -4, 2)$ C) $(-3, -4, 2)$ D) $(-3, 4, -2)$
6. $\lim_{x \rightarrow 0} [1 + x \sin(\pi - x)]^{\frac{1}{x}}$ is equal to
A) 0 B) e C) 1 D) π
7. $\int_0^{\pi} \log(\sin^2 x) dx =$
A) $2\pi \log_e\left(\frac{1}{2}\right)$ B) $2\pi \log_e(2)$ C) $\pi \log_e\left(\frac{1}{2}\right)$ D) $\pi \log_e(2)$
8. The general solution of the differential equation $2x + \frac{dy}{dx} - y = 3$ is
A) $y = 2x - 1$ B) $x^2 + y^2 = 2x - 1$ C) $y = C_1 e^x + 2x - 1$ D) $y^2 = C_1 e^x + 2x - 1$
9. A die is thrown 100 times. Getting an even number is considered as a success, the variance of number of successes is
A) 50 B) 25 C) 10 D) 100
10. In the set of integers under the operation $a \times b = a + b - ab$, the identity element is
A) 0 B) 1 C) a D) b