Sample Questions

1. If $S = \{a, b, c, d, e, f\}$ and A is a subset of S randomly chosen, then probability that A contains both a and b is

   [a] $\frac{1}{2}$ [b] $\frac{1}{4}$ [c] $\frac{1}{8}$ [d] $\frac{7}{16}$

2. If $\log_x(y^3) = 4$ then $\log_y(x^3)$ is equal to

   [a] $\frac{9}{4}$ [b] $\frac{3}{4}$ [c] $\frac{1}{12}$ [d] $\frac{4}{3}$

3. If $(\sqrt{3} + i)^{48} = a + ib$, where $i = \sqrt{-1}$, then

   [a] $a = 2^{48}$ [b] $b \neq 0$ [c] $a = 3^{24}$ [d] $b = \dfrac{1}{3^{24}}$

4. If the roots of the equation $ax^2 + bx + c = 0$ are $\sin\frac{3\pi}{8}$ and $\cos\frac{3\pi}{8}$ then the value of b^2 is

   [a] $a(a + 2c)$ [b] $\frac{-2(a+c)}{a}$ [c] $a(2a + c)$ [d] none of these

5. For a positive number a, $x = a + \dfrac{1}{a}, y = a + \dfrac{1}{a + \frac{1}{a}}$ and $z = a + \dfrac{1}{a + \frac{1}{a + \frac{1}{a}}}$, then x, y, z are arranged in increasing sequence as,

   [a] x, y, z [b] x, z, y [c] y, z, x [d] none of these

6. A diameter of a circle has its two extreme points as the foci of an ellipse. If the circle touches the ellipse, the eccentricity of the ellipse is

   [a] $\frac{1}{2}$ [b] $\frac{1}{\sqrt{2}}$ [c] $\frac{1}{2\sqrt{2}}$ [d] $\frac{1}{4}$

7. The differential equation $\dfrac{dy}{dx} = \sqrt{y},\ y(0) = 0$ has

   [a] exactly one solution [b] no solution [c] two differrent solutions [d] none of these

8. If $f(x) = \alpha + \beta|x - 1| + \gamma x|x|$, then

   [a] f is differentiable for all x [b] f is differentiable at 0 only if $\gamma = 0$ [c] f is differentiable at 1 only if $\beta = 0$ [d] f is not differentiable at $x = 0$ and $x = 1$

9. The value of the integral $\displaystyle\int_{-\frac{\pi}{3}}^{\frac{\pi}{3}} ([\tan x] + [\sin x])\, dx$ is

   [a] $\frac{\pi}{4}$ [b] 0 [c] $\frac{2\pi}{3}$ [d] none of these

10. The triangle having vertices $2\vec{i} - \vec{j}, 3\vec{i} - 4\vec{j}$ and $\vec{i} - 3\vec{j}$ is

    [a] an obtuse angled triangle [b] an equilateral triangle [c] a right angled triangle [d] an acute angled but not an equilateral angle