

JEE MAINS

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- 1) The mean and variance of a binomial distribution are α and $\frac{\alpha}{3}$ respectively. If $P(X = 1) = \frac{4}{243}$, then $P(X = 4 \text{ or } 5)$ is equal to:
 - a) $\frac{5}{9}$
 - b) $\frac{64}{81}$
 - c) $\frac{16}{27}$
 - d) $\frac{145}{243}$
- 2) Let E_1, E_2, E_3 be three mutually exclusive events such that $P(E_1) = \frac{2+3p}{6}$, $P(E_2) = \frac{2-p}{8}$ and $P(E_3) = \frac{1-p}{2}$. If the maximum and minimum values of p are p_1 and p_2 , then $(p_1 + p_2)$ is equal to :
 - a) $\frac{2}{3}$
 - b) $\frac{1}{3}$
 - c) $\frac{5}{4}$
 - d) 1
- 3) Let $S = \{\theta \in [0, 2\pi]; 8^{2\sin^2 \theta} + 8^{2\cos^2 \theta} = 16\}$. Then $n(S) + \sum_{\theta \in S} \left(\sec\left(\frac{\pi}{4} + 2\theta\right) \operatorname{cosec}\left(\frac{\pi}{4} + 2\theta\right) \right)$ is equal to :
 - a) 0
 - b) -2
 - c) -4
 - d) 12
- 4) $\tan\left(2 \tan^{-1} \frac{1}{5} + \sec^{-1} \frac{\sqrt{5}}{2} + 2 \tan^{-1} \frac{1}{8}\right)$ is equal to:
 - a) 1
 - b) 2
 - c) $\frac{1}{4}$
 - d) $\frac{5}{4}$
- 5) The statement $(\sim (p \Leftrightarrow \sim q)) \wedge q$ is:
 - a) a tautology
 - b) a contradiction
 - c) equivalent to $(p \Rightarrow q) \wedge q$
 - d) equivalent to $(p \Rightarrow q) \wedge p$
- 6) If for some $p, q, r \in R$, not all have same sign, one of the roots of the equation $(p^2 + q^2)x^2 - 2q(p+r)x + q^2 + r^2 = 0$ is also a root of the equation $x^2 + 2x - 8 = 0$, then $\frac{q^2 + r^2}{p^2}$ is equal to
- 7) The number of 5-digit natural numbers, such that the product of their digits is 36, is
- 8) The series of positive multiple of 3 is divided into sets: $\{3\}, \{6, 9, 12\}, \{15, 18, 21, 24, 27\}, \dots$. Then the sum of the elements in the 11^{th} set is equal to
- 9) The number of distinct real of the equation $x^5(x^3 - x^2 - x + 1) + x(3x^3 - 4x^2 - 2x + 4) - 1 = 0$ is
- 10) If the coefficients of x and x^2 in the expansion of $(1+x)^p(1-x)^q$, $p, q \leq 15$, are -3 and -5 respectively, then the coefficient of x^3 is equal to.
- 11) If $n(2n+1) \int_0^1 (1-x^n)^{2n} dx = 1177 \int_0^1 (1-x^n)^{2n+1} dx$, then $n \in N$ is equal to
- 12) Let a curve $y = y(x)$ pass through the point $(3, 3)$ and the area of the region under this curve, above the x -axis and between the abscissae 3 and $x(>3)$ be $\left(\frac{y}{x}\right)^3$. If this curve also passes through the point $(\alpha, 6\sqrt{10})$ in the first quadrant, then α is equal to
- 13) The equations of the sides AB, BC and CA of a triangle ABC are $2x + y = 0, x + py = 15a$ and $x - y = 3$ respectively. If its orthocentre is $(2, a)$, $-\frac{1}{2} < a < 2$, then p is equal to
- 14) Let the function $f(x) = 2x^2 - \log_e x, x > 0$, be decreasing in $(0, a)$ and increasing in $(a, 4)$. A tangent to the parabola $y^2 = 4ax$ at a point P on it passes through the point $(8a, 8a - 1)$ but does not pass through the point $(-\frac{1}{a}, 0)$. If the

equation of the normal at P is $\frac{x}{\alpha} + \frac{y}{\beta} = 1$, then $\alpha + \beta$ is equal to

- 15) Let Q and R be two points on the line $\frac{x+1}{2} = \frac{y+2}{3} = \frac{z-1}{2}$ at a distance $\sqrt{26}$ from the point $P(4, 2, 7)$. Then the square of the area of the PQR is