07-26-2022 SHIFT-1-16-30

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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 $P(X=4or5)$ 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) $\frac{5}{3}$
   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 $(p \implies q) \wedge q$
   d) equivalent to $(p \implies q) \wedge p$

6) If for some $p, q, r \in R$,not all have same sign, one of the roots of the equation $\left(p^2+q^2\right)x^2-2q(p+r)x+q^2+r^2=0$ 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 thet the product of their digits is 36, is

8) The series of positive multiple of 3 is divided into sets: $\{3\},\{6,9,12\},\{15,18,21,24,27\},\ldots$ Then the sum of the elments in the 11^{th} set is equal to

9) The number of distinct real of the equation $x^5\left(x^3-x^2-x+1\right)+x\left(3x^3-4x^2-2x+4\right)-1=0$ 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 $\left(\alpha, 6\sqrt{10}\right)$ 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 $\left(-\frac{1}{a},0\right)$. 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