MAINS

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16) If $\frac{dy}{dx} = \frac{xy}{x^2+y^2}$ and $y(1) = 1$, then a value of x satisfying $y(x) = e$ is:

a) $\sqrt{3}e$

b) $\frac{1}{2}\sqrt{3}e$

c) $\sqrt{2}e$

d) $\frac{e}{\sqrt{2}}$

17) If one end of focal chord AB of the parabola $y^2 = 8x$ is at $A\left(\frac{1}{2}, -2\right)$, then the equation of the tangent at B is:

a) $x + 2y + 8 = 0$

b) $2x - y - 24 = 0$

c) $x - 2y + 8 = 0$

d) $2x + y - 24 = 0$

18) Let a_n be the n^{th} term of a G.P. of positive terms. If $\sum_{n=1}^{100} a_{2n+1} = 200$ and $\sum_{n=1}^{100} a_{2n} = 100$, then $\sum_{n=1}^{200} a_n$ is equal to:

a) 300

b) 175

c) 225

d) 150

19) A random variable X has the following probability distribution. Then $P(X > 2)$ is:

X	1	2	3	4	5
P(X)	K^2	$2K$	K	$2K$	$5K^2$

a) $\frac{7}{12}$

b) $\frac{23}{26}$

c) $\frac{1}{36}$

d) $\frac{1}{6}$

20) If $\int \frac{d\theta}{\cos^2\theta(\tan 2\theta + \sec 2\theta)} = \lambda \tan\theta + 2\log_e|f(\theta)| + C$, where C is the constant of integration, then the ordered point $(\lambda, f(\theta))$ is:

a) $(-1, 1 - \tan\theta)$

b) $(-1, 1 + \tan\theta)$

c) $(1, 1 + \tan\theta)$

d) $(1, 1 - \tan\theta)$

21) Let $\mathbf{a}$, $\mathbf{b}$, and $\mathbf{c}$ be three vectors such that $|\mathbf{a}| = 3$, $|\mathbf{b}| = 5$,$\mathbf{a} \cdot \mathbf{b} = 10$ and the angle between $\mathbf{b}$ and $\mathbf{c}$ is $\frac{\pi}{3}$. If $\mathbf{a}$ is perpendicular to vector $\mathbf{b} \times \mathbf{c}$, then $|\mathbf{a} \times (\mathbf{b} \times \mathbf{c})|$ is equal to _____

22) If $C_r = {}^{25}C_r$ and $C_0 + 5 \cdot C_1 + 9 \cdot C_2 + \cdots + 101 \cdot C_{25} = 2^{25}.k$ then k is equal to _____

23) If the curves $x^2 - 6x + y^2 + 8 = 0$ and $x^2 - 8y + y^2 + 16 - k = 0$, $(k > 0)$ touch each other at a point , then the largest value of k is _____

24) The number of terms common to the A.P.'s $3, 7, 11, \ldots, 407$ and $2, 9, 16, \ldots, 709$ is _____

25) If the distance between the plane , $23x - 10y - 2z + 48 = 0$ and the plane containing the lines $\frac{x+1}{2} = \frac{y-3}{4} = \frac{z+1}{3}$ and $\frac{x+3}{2} = \frac{y+2}{6} = \frac{z-1}{\lambda}$, $(\lambda \in R)$ is equal to $\frac{k}{\sqrt{633}}$ the k is equal to _____