JEE MAINS 2023
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Integer Type

1) The sum to 20 terms of the series $2.2^2 - 3^2 + 2.4^2 - 5^2 + 2.6^2 - \dots$ is equal to
2) Let the mean of the data

x	1	3	5	7	9
Frequency (f)	4	24	28	α	8

TABLE 2

be 5. If m and σ^2 are respectively the mean deviation about the mean and the variance of the data, then $\frac{3\alpha}{m+\sigma^2}$ is equal to

3) Let α be the constant term in the binomial expansion of $\left(\sqrt{x} - \frac{6}{x^{\frac{3}{2}}}\right)^n$, $n \leq 15$. If the sum of the coefficients of the remaining terms in the expansion is 649 and the coefficient of x^{-n} is $\lambda\alpha$, then λ is equal to
4) Let $\omega = z\bar{z} + k_1 z + k_2 \iota z + \lambda(1+\iota)$, $k_1, k_2 \in \mathbb{R}$. Let $Re(\omega) = 0$ be the circle of radius 1 in the first quadrant touching the line $y = 1$ and the y-axis. If the curve $Im(\omega) = 0$ intersects C at A and B, then $30(AB)^2$ is equal to
5) Let $\mathbf{a} = 3i + j - k$ and $\mathbf{c} = 2i - 3j + 3k$. If $\mathbf{b}$ is a vector such that $\mathbf{a} = \mathbf{b} \times \mathbf{c}$ and $|\mathbf{b}|^2 = 50$, then $\left|72 - |\mathbf{b} + \mathbf{c}|^2\right|$ is equal to
6) Let m_1 and m_2 be the slopes of the tangents drawn from the point $\mathbf{P}(4,1)$ to the hyperbola $H : \frac{y^2}{25} - \frac{x^2}{16} = 1$. If $\mathbf{Q}$ is the point from which the tangents drawn to H have slopes m_1 and m_2, and they make positive intercepts α and β on the x-axis, then $\frac{(\mathbf{PQ})^2}{\alpha\beta}$ is equal to
7) Let the image of the point $\left(\frac{5}{3}, \frac{5}{3}, \frac{8}{3}\right)$ in the plane $x - 2y + z - 2 = 0$ be $\mathbf{P}$. If the distance of the point $\mathbf{Q}(6, -2, \alpha)$, $\alpha > 0$, from $\mathbf{P}$ is 13, then α is equal to
8) Let for $x \in \mathbb{R}$, $S_0(x) = x$, $S_k(x) = C_k x + k\int_0^x S_{k-1}(t)\,dt$ where $C_0 = 1$, $C_k = 1 - \int_0^1 S_{k-1}(x)\,dx$, $k = 1, 2, 3, \dots$. Then $S_2(3) + 6C_3$ is equal to
9) If $S = \{x \in \mathbb{R} : \sin^{-1}\left(\frac{x+1}{\sqrt{x^2+2x+2}}\right) - \sin^{-1}\left(\frac{x}{\sqrt{x^2+1}}\right) = \frac{\pi}{4}\}$, then $\sum_{x \in S}\left(\sin\left(\left(x^2+x+5\right)\frac{\pi}{2}\right)\right) - \left(\cos\left(\left(x^2+x+5\right)\right)\pi\right)$ is equal to
10) The number of seven digit positive integers formed using the digits 1, 2, 3 and 4 only and sum of the digits equal to 12 is