

JEE Main Session 2 Mathematics Exam: Model 4

- Find the solution of the differential equation $y \frac{dy}{dx} = x (\log_e x - \log_e y + 1)$, $x > 0$, $y > 0$ and passes through $(e, 1)$.
- $f(x) = \frac{4x + 3}{6x - 4}$ and $g(x) = f(f(x))$, then find $g(g(g(g(x))))$.
- $A = \{ 1, 2, 3, 4 \}$, $R = \{ (1, 2), (2, 3), (2, 4) \}$, $R \subseteq S$ and S is an equivalence relation, then the minimum number of elements to be added to R is n . Find the value of n .
- ABCD is a parallelogram where $A(\alpha, \beta)$, $B(1,0)$, $C(\gamma, \delta)$, and $D(3,2)$ and $AB = \sqrt{10}$. Find the value of $2(\alpha + \beta + \gamma + \delta)$.
- The distance of the point $Q(0,2,-2)$ from the line passing through the point $P(5,-4,3)$ and perpendicular to the line $r = (-3i + 2k) + \lambda(2i + 3j + 5k)$, $\lambda \in \mathbb{R}$ and $r = (i - 2j + k) + \mu(-i + 3j + 2k)$, $\mu \in \mathbb{R}$ is?
- Let S be the set of positive integral value of a for which $[(ax^2 + 2(a+1)x + 9a + 4) / (x^2 + 8x + 32)] < 0 \forall x \in \mathbb{R}$. Find the number of elements in S .
- For $\alpha, \beta, \gamma \neq 0$, if $\sin^{-1}\alpha + \sin^{-1}\beta + \sin^{-1}\gamma = \pi$ and $(\alpha + \beta + \gamma)(\alpha - \gamma + \beta) = 3\alpha\beta$, then find the value of γ .
- If $|a| = 1$, $|b| = 4$ and $a \cdot b = 2$. Also, $c = (3a \times b) - b$ and α is the angle between b and c , then what is the value of $192 \sin^2 \alpha$?
- If the system of linear equation $x - 2y + z = -4$, $2x + \alpha y + 3z = 5$ & $3x - y + \beta z = 3$ has infinitely many solutions then find the value of $12\alpha + 13\beta$.
- If 3, a , b , c are in A.P. and 3, $(a - 1)$, $(b + 1)$ are in G.P., then find the arithmetic mean of a , b and c .
- If $AP_1 = 3, 7, 11, \dots, 403$ and $AP_2 = 2, 5, 8, \dots, 401$. Find the sum of common terms of AP_1 and AP_2 .
- If $(t + 1)dx = (2x + (t + 1)^3)dt$ and $x(0) = 2$, then $x(1) = ?$
- Five people are distributed in four identical rooms. A room can also contain zero people. Find the number of ways to distribute them.
- If $5f(x) + 4f(1/x) = x^2 - 4$ and $y = 9f(x) * x^2$
If y is strictly increasing, then find the interval of x .
- If the hyperbola $x^2 - y^2 \operatorname{cosec}^2 \theta = 5$ and ellipse $x^2 \operatorname{cosec}^2 \theta + y^2 = 5$ has eccentricity e_H and e_E respectively and $e_H = \sqrt{7} e_E$, then find the value of θ .