JEE MAINS 2024
April 8 - Shift 1

EE24BTECH11061 - Rohith Sai

Single Correct

1) Let $f(x)$ be a positive function such that the area bounded by $y = f(x)$, $y = 0$ from $x = 0$ to $x = a > 0$ is $e^{-a} + 4a^2 + a - 1$. Then the differential equation, whose general solution is $y = c_1 f(x) + c_2$, where c_1 and c_2 are arbitrary constants, is

  a) $(8e^x + 1)\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$ c) $(8e^x + 1)\frac{d^2y}{dx^2} - \frac{dy}{dx} = 0$

  b) $(8e^x - 1)\frac{d^2y}{dx^2} - \frac{dy}{dx} = 0$ d) $(8e^x - 1)\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$

2) The number of critical points of the function $f(x) = (x - 2)^{\frac{2}{3}}(2x + 1)$ is

  a) 0   c) 3

  b) 1   d) 2

3) Let the sum of two positive integers be 24. If the probability, that their product is not less than $\frac{3}{4}$ times their greatest possible product, is $\frac{m}{n}$, where $gcd(m, n) = 1$, then $n - m$ equals

  a) 11   c) 9

  b) 10   d) 8

4) Let $H : \frac{-x^2}{a^2} + \frac{y^2}{b^2} = 1$ be the hyperbola, whose eccentricity is $\sqrt{3}$ and the length of the latus rectum is $4\sqrt{3}$. Suppose the point $(\alpha, 6)$, $\alpha > 0$ lies on H. If β is the product of the focal distances of the point $(\alpha, 6)$, then $\alpha^2 + \beta$ is equal to

  a) 169   c) 170

  b) 171   d) 172

5) The sum of all the solutions of the equation $8^{2x} - 16.8^x + 48 = 0$ is:

  a) $\log_8 6$ c) $1 + \log_8 6$

  b) $\log_8 4$ d) $1 + \log_6 8$