JEEM - 6Sep2020 - Shift1 - 16-30

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1) $\lim_{x\to 1}\left(\frac{\int_0^{(x-1)^2} t\cos(t^2)dt}{(x-1)\sin(x-1)}\right)$

a) is equal to 1 b) is equal to $\frac{1}{2}$ c) does not exist d) is equal to $\frac{-1}{2}$

2) If $\sum_{i=1}^{n}(x_i - a) = n$ and $\sum_{i=1}^{n}(x_i - a)^2 = na$, $(n, a > 1)$ then the standard deviation of n observations $x_1, x_2, x_3 \ldots x_n$ is:

a) $nv(a-1)$ b) $v(na-1)$ c) $a-1$ d) $v(a-1)$

3) If α and β be two roots of the equation $x^2 - 64x + 256 = 0$. Then the value of $(\frac{\alpha^3}{\beta^5})^{\frac{1}{8}} + (\frac{\beta^3}{\alpha^5})^{\frac{1}{8}}$ is:

a) 1 b) 3 c) 2 d) 4

4) The position of a moving car at time t is given by $f(t) = at^2 + bt + c, t > 0$, where a, b and c are real numbers greater than 1. Then the average speed of the car over the time interval $[t_1, t_2]$ is attained at the point

a) $\frac{(t_1+t_2)}{2}$ b) $2a(t_1 + t_2) + b$ c) $\frac{(t_2-t_1)}{2}$ d) $a(t_2 - t_1) + b$

5) If $I_1 = \int_0^1 (1-x^{50})^{100}dx$ and $I_2 = \int_0^1 (1-x^{50})^{101}dx$ such that $I_2 = \alpha I_1$ then α equals to

a) $\frac{5050}{5049}$ b) $\frac{5050}{5051}$ c) $\frac{5051}{5050}$ d) $\frac{5049}{5050}$

6) If $\mathbf{a}$ and $\mathbf{b}$ are unit vectors, then the greatest value of $\sqrt{3}\,|\mathbf{a}+\mathbf{b}| + |\mathbf{a}-\mathbf{b}|$ is

7) Let AD and BC be two vertical poles at A and B respectively on a horizontal ground. If $AD = 8m$, $BC = 11m$ and $AB = 10m$; then the distance (in meters) of a point M on AB from the point A such that $MD^2 + MC^2$ is minimum is

8) Let $f : \mathcal{R} \to \mathcal{R}$ be defined as $f(x) = \begin{cases} x^5 \sin\left(\frac{1}{x}\right) + 5x^2, & x < 0 \\ 0, & x = 0 \\ x^5 \cos\left(\frac{1}{x}\right) + \lambda x^2, & x > 0 \end{cases}$

The value of λ for which $f''(0)$ exists, is

9) The angle of elevation of the top of a hill from a point on the horizontal plane passing through the foot of the hill is found to be 45°. After walking a distance of

80 meters towards the top, up a slope inclined at an angle of 30° to the horizontal plane, the angle of elevation of the top of the hill becomes 75°. Then the height of the hill (in meters) is

10) Set A has m elements and set B has n elements. If the total number of subsets of A is 112 more than the total number of subsets of B, then the value of $m \times n$ is