JEEM - 8Jan2020 - Shift2 - 16-30

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1) The area (in sq. units) of the region $(x, y) \in \mathcal{R} : x^2 \leq y \leq 3 - 2x$, is: (8 Jan 2020 - S2)

   a) $\frac{31}{3}$ b) $\frac{32}{3}$ c) $\frac{29}{3}$ d) $\frac{34}{3}$

2) Let S be the set of all functions $f : [0, 1] \to \mathcal{R}$, which are continuous on $[0, 1]$ and differentiable on $(0, 1)$. Then for every f in S, there exists a $c \in (0, 1)$, depending on f, such that: (8 Jan 2020 - S2)

   a) $\frac{(f(1)-f(c))}{(1-c)} = f'(c)$
   b) $|f(c) - f(1)| < |f'(c)|$
   c) $|f(c) + f(1)| < (1 + c)|f'(c)|$
   d) $|f(c) - f(1)| < (1 - c)|f'(c)|$

3) The differential equation of the family of curves, $x^2 = 4b(y + b), b \in \mathcal{R}$, is: (8 Jan 2020 - S2)

   a) $xy'' = y'$
   b) $x(y')2 = x + 2yy'$
   c) $x(y')2 = x - 2yy'$
   d) $x(y')2 = 2yy' - x$

4) The system of linear equations

$$\lambda x + 2y + 2z = 5$$
$$2\lambda x + 3y + 5z = 8$$
$$4x + \lambda y + 6z = 10$$

   has: (8 Jan 2020 - S2)

   a) no solution when $\lambda = 2$
   b) infinitely many solutions when $\lambda = 2$
   c) no solution when $\lambda = 8$
   d) a unique solution when $\lambda = -8$

5) If the 10^{th} term of an A.P. is $\frac{1}{20}$ and its 20^{th} term is $\frac{1}{10}$, then the sum of its first 200 terms is: (8 Jan 2020 - S2)

   a) $50\frac{1}{4}$
   b) 100
   c) 50
   d) $100\frac{1}{2}$

6) Let a line $y = mx$ $(m > 0)$ intersect the parabola, $y^2 = x$ at a point P, other than the origin. Let the tangent to it at P meet the x-axis at the point Q. If $area(\Delta OPQ) = 4$ sq.units, then m is equal to ... (8 Jan 2020 - S2)

7) Let $f(x)$ be a polynomial of degree 3 such that $f(-1) = 10$, $f(1) = -6$, $f(x)$ has a critical point at $x = -1$ and $f'(x)$ has a critical point at $x = 1$. Then the local minima at $x = \ldots$ (8 Jan 2020 - S2)

8) $\frac{\sqrt{2}\sin\alpha}{\sqrt{1+\cos 2\alpha}} = \frac{1}{7}$ and $\sqrt{\frac{1-\cos 2\beta}{2}} = \frac{1}{\sqrt{10}}$, $\alpha, \beta \in \left(0, \frac{\pi}{2}\right)$, then $\tan(\alpha + 2\beta)$ is equal to $\ldots$ (8 Jan 2020 - S2)

9) The number of 4 letter words (with or without meaning) that can be made from the eleven letters of the word "EXAMINATION" is ... (8 Jan 2020 - S2)

10) The sum, $\sum_{n=1}^{7} \frac{n(n+1)(2n+1)}{4}$ is equal to ... (8 Jan 2020 - S2)