MATHS

BOOKS - JEE MAINS PREVIOUS YEAR ENGLISH

CONTINUITY AND DIFFERENTIABILITY

Others

1. Let $f(x) = \begin{cases} (x-1)\dfrac{\sin 1}{x-1} & \text{if } x \neq 10, \\ & \text{if } x = 1 \end{cases}$. Then which one of the following is true? f is differentiable at $x = 0$ and at $x - 1$ f is differentiable at $x = 0$ but not at $x = 1$ f is differentiable at $x = 0$ nor at $x = 1$ f is differentiable at $x = 1$ but not at $x = 0$

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2. Let y be an implicit function of x defined by $x^{2x} - 2x^x \cot y - 1 = 0$. Then y' (1) equals

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3. The value of p and q for which the function $f(x) = \left\{ \frac{\sin(p+1)x + \sin x}{x}, x < 0 q, x = 0 \frac{\sqrt{x+x^2} - \sqrt{x}}{x^{3/2}}, x > 0 \right\}$ is continuous for all x in R, are: (1) $p = \frac{1}{2}, q = -\frac{3}{2}$ (2) $p = \frac{5}{2}, q = -\frac{1}{2}$ (3) $p = -\frac{3}{2}, q = \frac{1}{2}$ (4) $p = \frac{1}{2}, q = \frac{3}{2}$

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4. Let a, b R be such that the function f given by $f(x) = \ln|x| + bx^2 + ax, x \neq 0$ has extreme values at $x = 1$ and $x = 2$. Statement 1: f has local maximum at $x = 1$ and at $x = 2$. Statement 2: $a = \frac{1}{2} \text{and} b = \frac{-1}{4}$ (1) Statement 1 is false, statement 2

is true (2) Statement 1 is true, statement 2 is true; statement 2 is a correct explanation for statement 1 (3) Statement 1 is true, statement 2 is true; statement 2 is not a correct explanation for statement 1 (4) Statement 1 is true, statement 2 is false

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5. Consider the function $f(x) = |x-2| + |x-5|, x \in R$. Statement 1: $f'(4) = 0$ Statement 2: f is continuous in $[2, 5]$, differentiable in $(2, 5)$ and $f(2) = f(5)$. (1) Statement 1 is false, statement 2 is true (2) Statement 1 is true, statement 2 is true; statement 2 is a correct explanation for statement 1 (3) Statement 1 is true, statement 2 is true; statement 2 is not a correct explanation for statement 1 (4) Statement 1 is true, statement 2 is false

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6. If $x = -1$ and $x = 2$ are extreme points of $f(x) = \alpha \log|x| + \beta x^2 + x$, then (1) $\alpha = -6, \beta = \frac{1}{2}$ (2) $\alpha = -6, \beta = -\frac{1}{2}$ (3) $\alpha = 2, \beta = -\frac{1}{2}$ (4) $\alpha = 2, \beta = \frac{1}{2}$

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7. For $x \in R$, $f(x) = |\log 2 - \sin x|$ and $g(x) = f(f(x))$, then

(1)g is not differentiable at $x = 0$

(2) $g'(0) = \cos(\log 2)$

(3) $g'(0) = -\cos(\log 2)$

(4) g is differentiable at $x = 0$ and $g'(0) = -\sin(\log 2)$

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