

11B36

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36. For $x \in \mathbb{R}$, $f(x) = |\log 2 - \sin x|$ and $g(x) = f(f(x))$, then (JEE M 2016)

- (a) $g'(0) = -\cos(\log 2)$
- (b) g is differentiable at $x=0$ and $g'(0) = -\sin(\log 2)$
- (c) g is not differentiable at $x=0$
- (d) $g'(0) = \cos(\log 2)$

37.

$$\lim_{x \rightarrow \infty} \left(\frac{(n+1)(n+2)\dots 3n}{n^{2n}} \right)^{\frac{1}{n}}$$

is equal to:

(JEE M 2016)

- (a) $\frac{9}{e^2}$
- (b) $3\log 3 - 2$
- (c) $\frac{18}{e^4}$
- (d) $\frac{27}{e^2}$

38. Let $p =$

$$\lim_{x \rightarrow 0^+} (1 + \tan^2 \sqrt{x})^{\frac{1}{2x}}$$

then $\log p$ is equal to:

(JEE M 2016)

- (a) $\frac{1}{2}$
- (b) $\frac{1}{4}$
- (c) 2
- (d) 1

39.

$$\lim_{x \rightarrow \frac{\pi}{2}} \frac{\cot x - \cos x}{(\pi - 2x)^3}$$

equals

(JEE M 2017)

- (a) $\frac{1}{4}$
- (b) $\frac{1}{24}$
- (c) $\frac{1}{16}$
- (d) $\frac{1}{8}$

40. For each $t \in \mathbb{R}$, let $[t]$ be the greatest integer less than or equal to t . Then

$$\lim_{x \rightarrow 0^+} x \left(\left[\frac{1}{x} \right] + \left[\frac{2}{x} \right] + \dots + \left[\frac{15}{x} \right] \right)$$

(JEE M 2018)

- (a) is equal to 15
- (b) is equal to 120
- (c) *does not exist* (in \mathbb{R})
- (d) is equal to 0

41. For $S = \{t \in \mathbb{R} : f(x) = |x - \pi|(e^{|x|} - 1)\sin|x| \text{ is not differentiable at } t\}$. Then the set S is equal to: (JEE M 2018)

- (a) 0
- (b) π
- (c) $0, \pi$
- (d) \emptyset (an empty set)

42.

$$\lim_{y \rightarrow 0} \frac{\sqrt{1 + \sqrt{1 + y^4}} - \sqrt{2}}{y^4}$$

(JEE M 2019- 9 Jan(M))

- (a) exists and equals $\frac{1}{4\sqrt{2}}$
- (b) exists and equals $\frac{1}{2\sqrt{2}(\sqrt{2}+1)}$
- (c) exists and equals $\frac{1}{2\sqrt{2}}$
- (d) does not exist

43. Let $f : \mathbb{R} \rightarrow \mathbb{R}$ is a function defined as

(JEE M 2019- 9 Jan(M))

$$f(x) = \begin{cases} 5, & \text{if } x \leq 1 \\ a + bx, & \text{if } 1 < x < 3 \\ b + 5x, & \text{if } 3 \leq x < 5 \\ 30, & \text{if } x \geq 5 \end{cases} \quad (1)$$

- (a) continuous if $a = 5$ and $b = 5$
- (b) continuous if $a = -5$ and $b = 10$
- (c) continuous if $a = 0$ and $b = 5$
- (d) not continuous for any values of a and b

44. If the function f defined on $\left(\frac{\pi}{3}, \frac{\pi}{6}\right)$ by

$$f(x) = \begin{cases} \frac{\sqrt{2}\cos x - 1}{\cot x - 1}, & x \neq \frac{\pi}{4} \\ k, & x = \frac{\pi}{4} \end{cases} \quad (2)$$

(JEE M 2019- 9 April(M))

- (a) 2
- (b) $\frac{1}{2}$
- (c) 1
- (d) $\frac{1}{\sqrt{2}}$

45. Let $f(x) = 15 - |x - 10|$, $x \in \mathbb{R}$. Then the set of all values of x , at which the function, $g(x) = f(f(x))$ is not differentiable, is: (JEE M 2019- 9 April(M))

- (a) 5, 10, 15

- (b) 10,15
- (c) 5,10,15,20
- (d) 10