11B(36-37)

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36) For $x \in \mathbb{R}$, $f(x) = \left|\log 2 - \sin(x)\right|$ 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)
$$\lim_{x\to\infty}\left(\frac{(n+1)(n+2)...3n}{n^{2n}}\right)^{\frac{1}{n}}$$
is equal to: (JEE M 2016)

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

38) Let p =
$$\lim_{x\to 0^+}\left(1+\tan^2(\sqrt{x})\right)^{\frac{1}{2x}}$$
then $\log p$ is equal to: (JEE M 2016)

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

39)
$$\lim_{x\to\frac{\pi}{2}}\frac{\cot(x)-\cos(x)}{(\pi-2x)^3}$$
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
$$\lim_{x\to 0^+} x\left(\left[\frac{1}{x}\right]+\left[\frac{2}{x}\right]+...+\left[\frac{15}{x}\right]\right)$$
(JEE M 2018)

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

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

(a) 0 (c) $0, \pi$
(b) π (d) $\emptyset(anemptyset)$

42)
$$\lim_{y\to 0}\frac{\sqrt{1+\sqrt{1+y^4}}-\sqrt{2}}{y^4}$$
(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 $f : \mathbb{R} \to \mathbb{R}$ is a function defined as (JEE M 2019- 9 Jan(M))
$$f(x) = \begin{cases} 5, & if x \le 1 \\ a+bx, & if 1 < 3 \\ b+5x, if 3 \le x < 5 \\ 30, & if x \ge 5 \end{cases} \quad (1)$$

(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
$$f(x) = \begin{cases} \frac{\sqrt{2}cosx-1}{cotx-1}, x \ne \frac{\pi}{4} \\ k, x = \frac{\pi}{4} \end{cases} \quad (2)$$
(JEE M 2019- 9 April(M))

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

45) Let $f(x) = 15 - |x-10|, x \to \mathbb{R}$. 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) $\{5, 10, 15\}$ (c) $\{5, 10, 15, 20\}$
(b) $\{10, 15\}$ (d) $\{10\}$