Chapter-11 Section-A

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26) Let $[x]$ be the greatest integer less than or equal to x. Then, at which of the following points the function $f(x) = x\cos(\pi(x + [x]))$ is discontinuous? (JEE Adv.2017)

a) $x = -1$ b) $x = 0$

c) $x = 1$ d) $x = 2$

27) Let $f(x) = \frac{1-x(1+|1-x|)}{|1-x|}\cos\left(\frac{1}{|1-x|}\right)$ for $x \neq 1$ .Then (JEE Adv.2017)

a) $\lim_{x\to 1^-} f(x) = 0$
b) $\lim_{x\to 1^-}$does not exist
c) $\lim_{x\to 1^+} f(x) = 0$
d) $\lim_{x\to 1^+}$does not exist

28) Let $f : \mathbb{R} \to \mathbb{R}$ $g : \mathbb{R} \to \mathbb{R}$ be two non-differentiable functions. If $f'(x) = (e^{(f(x)-g(x))})g'(x)$ for all $x \in R$,and $f(1) = g(2) = 1$, then which of the following statement (s) is (are) TRUE? (JEE Adv.2018)

a) $f(2) < 1 - \log_e 2$ b) $f(2) > 1 - \log_e 2$

c) $g(2) > 1 - \log_e 2$ d) $g(2) < 1 - \log_e 2$

29) Let$f : \mathbb{R} \to \mathbb{R}$ given by

$$f(x) = \begin{cases} x^5 + 5x^4 + 10x^3 + 10x^2 + 3x + 1, & \text{if } x < 0; \\ x^2 - x + 1, & \text{if } 0 \le x < 1; \\ \frac{2}{3}x^3 - 4x^2 = 7x - \frac{8}{3} & \text{if } 1 \le x < 3; \\ (x-2)\log_e(x-2) - x = \frac{10}{3}, & \text{if } x \ge 3 \end{cases}$$

Then which of the following option is/are correct? (JEE Adv.2019)

a) f' has a local maximum at at x=1
b) f is increasing on $(-\infty, 0)$
c) f' is NOT differentiable at $x = 1$
d) $f$is onto

30) Let $f : R \to R$ be a function. We say that f has

PROPERTY 1 if $\lim_{h\to 0} \frac{f(h)-f(0)}{\sqrt{|h|}}$ exists and is finite, and
PROPERTY 2 if $\lim_{h\to 0} \frac{f(h)-(0)}{h^2}$ exists and is finite
Then which of the following options is/are correct? (JEE Adv.2019)

a) $f(x) = x^{\frac{2}{3}}$ has **PROPERTY 1**
b) $f(x) = \sin x$ has **PROPERTY 2**
c) $(x) = |x|$ has **PROPERTY 1**
d) $(x) = x|x|$ has **PROPERTY 2**