

الف) $\frac{9}{3}, 3$ ✓

①

ب) $\frac{9}{3}, 3$ ✓

ج) $\frac{9}{3}, 3$ ✓

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د) $\frac{9}{3}, 3$ ✓

الف) $1, 2, 4$

ب) $[1, 2], 9$ ✓

ج) 10

د) 10

②

الف) $\frac{9}{3}$

ب) 4

ج) 8 ✓

د) 8

③

الف) $\lim_{n \rightarrow 1} \frac{n-1}{n^2-n+1} = \frac{n-1}{(n-1)(n+1)} = \frac{1}{n+1} \rightarrow \begin{cases} \frac{1}{2}, +\infty \\ \frac{1}{2}, -\infty \end{cases}$ ✓

ب) $\lim_{n \rightarrow 2} \frac{n-4}{n^2-n+9} = \frac{n-4}{(n-2)^2} = \frac{-1}{0^+} = -\infty$ ✓

بدلیل وجود 0^+ در مخرج و -1 در صورتی است و جواب $-\infty$ خواهد شد.

الف) $-\infty^+ \rightarrow -\infty, 9^- \rightarrow [9^-], 8$ و $2n, -15^+ \rightarrow [-15^+], -15 \rightarrow [-\infty] - [2n] = 1 - (-15) = 16$ ✓

$-\infty^- \rightarrow -\infty, 9^+ \rightarrow [9^+], 9$ و $2n, -15^- \rightarrow [2n], -16 \rightarrow [-\infty] - [2n] = 2n$ ✓

ب) $n < \frac{1}{4} \rightarrow n^4 > \frac{1}{16} \rightarrow -n^4 < \frac{1}{16} \rightarrow \frac{1}{-n^4} > -16 \rightarrow \left[\frac{1}{-n^4} \right], -16$ ✓

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الف) $f(x) = f(x^2 - x^2 + 1) \rightarrow f(x) = 1 - x^2 - 1 - x^2 \rightarrow 1 - x^2(1 - x) \rightarrow 1 - x^2$ (6)

$\rightarrow \frac{1}{x^2 - 1} \rightarrow f(1) = 1, f(x) = 1 - x^2 \rightarrow$ 

$\rightarrow \lim_{x \rightarrow 1} [f(x)] = \lim_{x \rightarrow 1} [1 - x^2] = 0$

ب) $\begin{aligned} &0^+ \rightarrow \lim_{x \rightarrow 0^+} [x^2] = 0 \\ &0^- \rightarrow \lim_{x \rightarrow 0^-} [x^2] = 0 \end{aligned}$

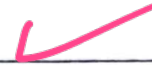
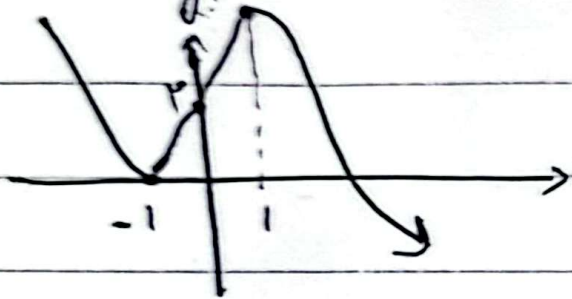
الف) $\begin{aligned} x^+ &\rightarrow \frac{x^2 - 1}{x^2 - 1} = \frac{(x-1)(x+1)}{(x-1)(x+1)} = \frac{x+1}{x+1} = 1 \\ x^- &\rightarrow \frac{-(x^2 - 1)}{(x^2 - 1)} = \frac{-1}{1} = -1 \end{aligned}$ (7)

ب) $\begin{aligned} x^- &\rightarrow \frac{\sin x}{\cos x} = \frac{1}{\cos x} = \frac{1}{1} = 1 \\ x^+ &\rightarrow \frac{-\sin x}{\cos x} = \frac{-1}{1} = -1 \end{aligned}$

الف) $\frac{x^+}{x^-} \rightarrow \lim_{x \rightarrow 0} \frac{1}{\cos x} = 1$ ب) $\begin{aligned} &0^+ \rightarrow \lim_{x \rightarrow 0^+} (\sqrt{x}) = 0 \\ &0^- \rightarrow \lim_{x \rightarrow 0^-} (\sqrt{x}) = 0 \end{aligned}$

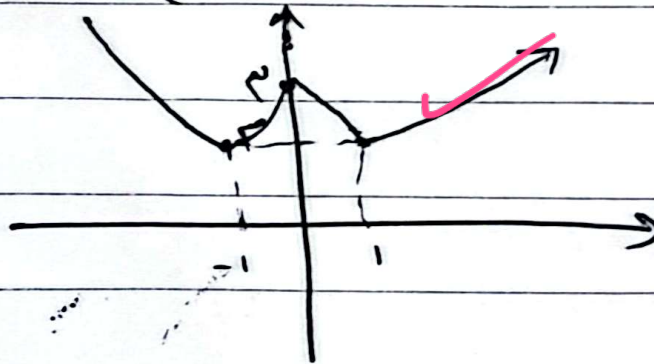
الف) $\frac{1}{x^2(x-1)} = \frac{1}{x^2} = \infty$ ب) $\begin{aligned} x^+ &\rightarrow \frac{x^2 - 1}{x^2 - 1} = \frac{x-1}{x-1} = 1 \\ x^- &\rightarrow \frac{x^2 - 1}{x^2 - 1} = \frac{x-1}{x-1} = 1 \end{aligned}$ (8)

الف) $y' = 12x^2 - 12x \rightarrow 12x^2(1-x) \rightarrow \frac{-1 \pm \sqrt{1+12}}{2} \rightarrow \frac{1}{2}, \frac{5}{2}, 0$ (10)



ب) $y' = 6x^2 - 6x \rightarrow 6x^2(x-1) = 0 \rightarrow x = \pm 1, x = 0 \rightarrow \frac{-1 \pm \sqrt{1+12}}{2}$

$\frac{1}{2}, \frac{5}{2}, \frac{-1}{2}$



بوابات