

(۱)

ج) $\lim_{x \rightarrow 1} \frac{x^2 + 5}{x + 1} = \frac{6}{2} = 3$
 حد چپ و راست یکسان است

۲

د) $\lim_{x \rightarrow 0} \frac{x^2 + 1}{[x]}$ $\left\{ \begin{array}{l} x \rightarrow 0^+ \rightarrow \frac{1}{0} \rightarrow \infty \\ x \rightarrow 0^- \rightarrow \frac{1}{0} \rightarrow -\infty \end{array} \right\} \Rightarrow$ چون حد چپ و راست
 تعریف نشده شد $\Rightarrow$ حد ندارد

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

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

۲

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

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

الف) $\lim_{x \rightarrow 1^-} \frac{x^2 + 1}{x} \rightarrow \frac{2}{1} = 2$

ب) $\lim_{x \rightarrow 1^-} \left[\frac{x^2 + 1}{x} \right] \rightarrow \lim [2] = 2$

(۳)

ج) $\lim_{x \rightarrow 1^-} \left[\frac{x^2 + 1}{x} \right] \rightarrow [2] = 2$

د) $\lim_{x \rightarrow 1^+} \left[\frac{x^2 + 1}{x} \right] \rightarrow [2] = 2$

۲

الف) $\left\{ \begin{array}{l} 1^+ \rightarrow \frac{x - 5}{x^2 - 4x + 5} = \frac{-4}{0^-} = +\infty \\ 1^- \rightarrow \frac{x - 5}{x^2 - 4x + 5} = \frac{-4}{0^+} = -\infty \end{array} \right\} \rightarrow$ حد ندارد

نتیجه $\frac{1}{+} \frac{5}{-}$

(۴)

دقت کن!

ب) $\left\{ \begin{array}{l} 1^+ \rightarrow \frac{x - 5}{x^2 - 4x + 4} = \frac{-1}{0^+} = -\infty \\ 1^- \rightarrow \frac{x - 5}{x^2 - 4x + 4} = \frac{-1}{0^+} = -\infty \end{array} \right\} \rightarrow$ چون مقدار مشخصی ندارد و حد ندارد

$\frac{1}{+} \frac{5}{+}$

۱، ۵

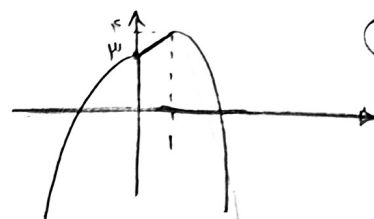
الف) $\left. \begin{array}{l} -3^+ \rightarrow [-3(-3^+)] + [-5(-3^+)] = 1 + 15 = \frac{16}{2} \\ -3^- \rightarrow [-3(-3^-)] + [-5(-3^-)] = 9 + 15 = \frac{24}{2} \end{array} \right\} \rightarrow \text{حد ندارد}$

⑤

1.5

ب) $\lim_{x \rightarrow (-\frac{1}{\sqrt{e}})^-} \left[\frac{-1}{x^{\sqrt{e}}} \right] \rightarrow \lim_{x \rightarrow -\frac{1}{\sqrt{e}}^-} \left[\frac{-1}{\frac{1}{\sqrt{e}}} \right] \rightarrow \frac{-\sqrt{e}}{1}$

مسئله $\rightarrow -11x^{13} + 11x^9 \rightarrow 11x^9(1-x) \rightarrow \frac{0}{0} \rightarrow \frac{+}{+} \rightarrow \frac{+}{-}$



④

الف) $\left. \begin{array}{l} 1^+ \rightarrow 3 \\ 1^- \rightarrow 3 \end{array} \right\} \text{مطابق شکل} \quad \frac{3}{3} = \text{حد}$

ب) $\left. \begin{array}{l} 0^+ \rightarrow 3 \\ 0^- \rightarrow 2 \end{array} \right\} \text{حد ندارد}$

2

الف) $\left. \begin{array}{l} 2^+ \rightarrow \lim_{x \rightarrow 2^+} \frac{x^{10} - 1}{x^9 - 5} \xrightarrow{\frac{0}{0}} \text{Hôpital} \rightarrow \frac{10x^9}{9x^8} = \frac{10(2^9)}{9(2^8)} = \frac{10}{9} = \frac{10}{9} \\ 2^- \rightarrow \lim_{x \rightarrow 2^-} \frac{1 - x^{10}}{x^9 - 5} \xrightarrow{\frac{0}{0}} \text{Hôpital} \rightarrow \frac{-10x^9}{9x^8} = \frac{-10(2^9)}{9(2^8)} = \frac{-10}{9} \end{array} \right\} \text{حد ندارد}$

⑦

ب) $\left. \begin{array}{l} \pi^+ \rightarrow \frac{-\sin x}{x \sin x \cos x} = -\frac{1}{x \cos x} \rightarrow -\frac{1}{2(1)} = -\frac{1}{2} \\ \pi^- \rightarrow \frac{\sin x}{x \sin x \cos x} = \frac{1}{x \cos x} \rightarrow \frac{1}{2(1)} = \frac{1}{2} \end{array} \right\} \text{حد ندارد}$

الف) $\left. \begin{array}{l} \frac{3\pi}{4}^+ \rightarrow \sqrt{0^+} = 0 \\ \frac{3\pi}{4}^- \rightarrow \sqrt{0^-} = 0 \end{array} \right\} \text{حد ندارد}$

①

ب) $\left. \begin{array}{l} 0^+ \rightarrow \sqrt{0^+ - 2\sqrt{0^+}} = 0 \\ 0^- \rightarrow \sqrt{0^- - 2\sqrt{0^-}} = 0 \end{array} \right\} \text{حد ندارد}$

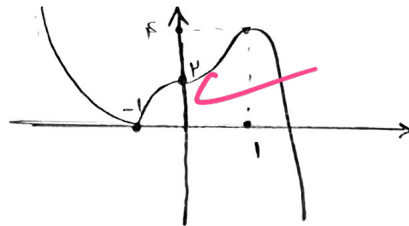
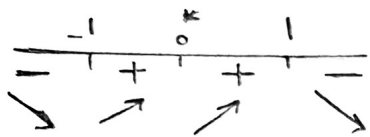
1.5

$$1 \rightarrow [-2^p(-2^p)] + 2^p \dots$$

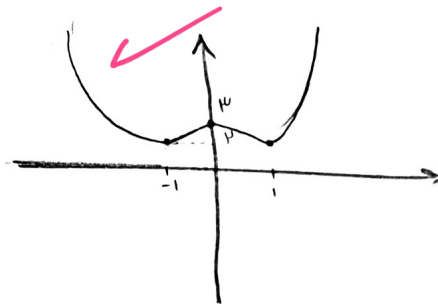
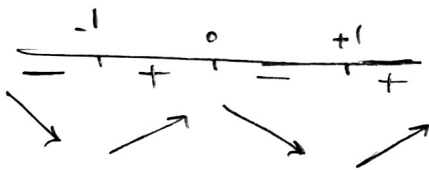
الف) $\rightarrow \frac{(-1)^0}{x^p - x^p} \rightarrow \lim_{x \rightarrow 0^+} \frac{1}{x^p - x^p} = \frac{1}{0^-} = -\infty$ فنتج (9)

ب) $\left. \begin{array}{l} p^+ \rightarrow \lim_{x \rightarrow p^+} \frac{x^p - p^p}{x - p} \rightarrow \text{hop} \rightarrow \frac{p^p}{1} = p^p \\ p^- \rightarrow \lim_{x \rightarrow p^-} \frac{x^p - p^p}{x - p} \rightarrow \frac{1}{1} = 1 \end{array} \right\}$ متساوي (10)

الف) $y = \cos x^p - p^p \cos x^p \rightarrow y' = -1 \sin x^p - 1 \sin x^p \Rightarrow -1 \sin x^p (1 - x^p)$



ب) $y = x^p - p^p x^p + p^p \rightarrow y' = p x^{p-1} - p^p x \Rightarrow p x (x^{p-1} - 1)$



$n - 2\sqrt{n} \geq 0 \rightarrow \sqrt{n}(\sqrt{n} - 2) \geq 0$ II

$\Rightarrow n \geq 4$

$n \geq 0$ I

سوال ۸ - ب

$I \cap II \quad n = 0 \leq n \leq 4 \rightarrow$ تبراهان ضریف نفسه

$\lim_{n \rightarrow \infty} \sqrt{n - 2\sqrt{n}} = \infty$

$$\lim_{n \rightarrow -3} [-3n] - [an] \rightarrow \lim_{n \rightarrow -3^+} [-3n] - [an] = 1 - (-18) = 19$$

$$\hookrightarrow \lim_{n \rightarrow -3^-} [-3n] - [an] = 9 - (-19) = 28$$

د-الف

ب) $x < -\frac{1}{4} \rightarrow x^k > \frac{1}{14} \rightarrow -x^k < -\frac{1}{14} \rightarrow -\frac{1}{x^k} > -14$

$$\lim_{x \rightarrow -\frac{1}{4}} \left[-\frac{1}{x^k} \right] = -14$$

د-ب