

الف) $\lim_{x \rightarrow 2^+} \frac{x+5}{x+1} = \frac{7}{3} \quad (3)$

ب) $\lim_{x \rightarrow 2^-} \frac{x+5}{x+1} = \frac{7}{3} \quad (3)$

ج) $\lim_{x \rightarrow 2} \frac{x+5}{x+1} = (3)$

د) $\lim_{x \rightarrow 0} \frac{x^2+7}{x^3} \rightarrow \begin{matrix} 1) x \rightarrow 0^+ \rightarrow x^2 > 0 \rightarrow x^3 > 0 \\ 2) x \rightarrow 0^- \rightarrow x^2 > 0 \rightarrow x^3 < 0 \end{matrix} \rightarrow x \rightarrow 0 \rightarrow x^3 \rightarrow 0$

$\Rightarrow \frac{7}{0^+} = \frac{7}{0} \rightarrow \infty$

الف) $\lim_{x \rightarrow 2^-} f(x) = 2 \rightarrow f(2) = 2 \quad (2)$

ب) $\lim_{x \rightarrow 2^-} [f(x-2)] \rightarrow [10^-] = 9$

ج) $\left[\lim_{x \rightarrow 2^-} f(x-2) \right] = 10$

د) $\left[\lim_{x \rightarrow 2^+} f(x-2) \right] = 10$

الف) $\lim_{x \rightarrow 2^-} \frac{f(x)+1}{x} \rightarrow \frac{f(2)+1}{2} = \frac{7}{2} \quad (3)$

ب) $\lim_{x \rightarrow 2^-} \left[\frac{f(x)+1}{x} \right] \rightarrow [5^-] = 5$

ج) $\left[\lim_{x \rightarrow 2^-} \frac{f(x)+1}{x} \right] \rightarrow 5$

د) $\left[\lim_{x \rightarrow 2^+} \frac{f(x)+1}{x} \right] = 5$

سوال ۱۰

الف) $\lim_{x \rightarrow 1} \frac{x-5}{x^2-4x+5}$ (۴)

$\frac{1-5}{1-4+5} = \frac{-4}{2} = -2$

یا $\frac{0}{0}$ $\rightarrow$ $\frac{-4}{0^+} = +\infty$ $\frac{-4}{0^-} = -\infty$

ب) $\lim_{x \rightarrow 3} \frac{x^2-4}{x^2-4x+9}$ $\rightarrow \frac{3-4}{(3-4)^2} = \frac{-1}{1} = -1$

$\frac{0}{0}$ $\rightarrow$ $\frac{-1}{0^+} = +\infty$ $\frac{-1}{0^-} = -\infty$

الف) $\lim_{x \rightarrow -3} [x^2] - [2x]$ (۵)

$x \rightarrow -3^- \rightarrow 9 - (-6) = 15$

$x \rightarrow -3^+ \rightarrow 9 - (-6) = 15$

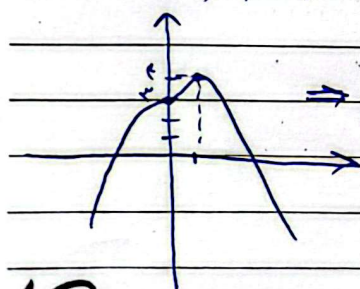
ب) $\lim_{x \rightarrow (-\frac{1}{4})^-} [\frac{1}{x^2}]$ $\rightarrow x \rightarrow (-\frac{1}{4})^- \rightarrow x < -\frac{1}{4} \rightarrow x^2 > \frac{1}{16} \rightarrow \frac{1}{x^2} < 16$

$\rightarrow \frac{1}{x^2} > -16 \rightarrow [-16^+]$ $\rightarrow -16$

الف) $\lim_{x \rightarrow 1} [-x^3 + x^2 + 3]$ (۶)

$\Rightarrow y' = -3x^2 + 2x \rightarrow 12x^2(-x+1)$

$f(0) = 3, f(1) = 3$



$\Rightarrow \lim_{x \rightarrow 1} [-x^3 + x^2 + 3] = [3] = 3$

Parsian

ب) $\lim_{x \rightarrow 0} [x^3 - 3x^2 + 3]$

چون مقدار معین است پس حد آن برابر با مقدار آن است

$x \rightarrow 0^- \rightarrow \lim_{x \rightarrow 0^-} p(x) = 3$
 $x \rightarrow 0^+ \rightarrow \lim_{x \rightarrow 0^+} p(x) = 3$

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

$x \rightarrow 2^+ \rightarrow \frac{x^2 - 1}{x^2 - 2} = \frac{(x-1)(x^2 + x + 1)}{(x-2)(x+2)} = \frac{1 \cdot 7}{-1 \cdot 4} = -\frac{7}{4}$
 $x \rightarrow 2^- \rightarrow \frac{x^2 - 1}{x^2 - 2} = \frac{-1 \cdot 7}{-1 \cdot 4} = \frac{7}{4} \rightarrow \lim_{x \rightarrow 2} f(x) = -\frac{7}{4}$

ب) $\lim_{x \rightarrow \pi} \frac{|\sin x|}{\sin x}$

$x \rightarrow \pi^- \rightarrow \frac{\sin x}{\sin x} = \frac{\sin x}{x \sin x \cos x} = \frac{1}{x \cos x} = -\frac{1}{\pi}$
 $x \rightarrow \pi^+ \rightarrow \frac{-\sin x}{\sin x} = -\frac{1}{x \cos x} = \frac{1}{\pi} \rightarrow \lim_{x \rightarrow \pi} g(x) = -\frac{1}{\pi}$

الف) $\lim_{x \rightarrow \frac{3\pi}{2}} \sqrt{\cos x}$

$x \rightarrow \frac{3\pi}{2}^+ \rightarrow \cos \frac{3\pi}{2} = 0 \rightarrow \sqrt{0} = 0$
 $\lim_{x \rightarrow \frac{3\pi}{2}^+} h(x) = 0$
 $x \rightarrow \frac{3\pi}{2}^- \rightarrow$ تعریف نشده

ب) $\lim_{x \rightarrow 0} \sqrt{x - 2\sqrt{x}}$

$x \rightarrow 0^+ \rightarrow \sqrt{(\sqrt{x}-1)^2 - 1} \rightarrow x > 0 \rightarrow \sqrt{x} > 0$
 $\sqrt{x} - 1 > -1 \rightarrow \sqrt{x} - 1 < 1 \rightarrow \sqrt{x} - 1 < 0$
 $\rightarrow \lim_{x \rightarrow 0^+} t(x) = 2$
 $\lim_{x \rightarrow 0^-} t(x) =$ تعریف نشده

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$\lim_{x \rightarrow 0^+} \sin x = 0^+$

بازرسی

الف) $\lim_{x \rightarrow 0^+} \frac{(-1)^{\lfloor \sin x \rfloor}}{x^3 - x^2} \rightarrow \frac{(-1)^0}{x^3 - x^2} = \frac{1}{x^2 - x^3} = \frac{1}{x^2(1-x)} \rightarrow \frac{1}{0^+} = +\infty$

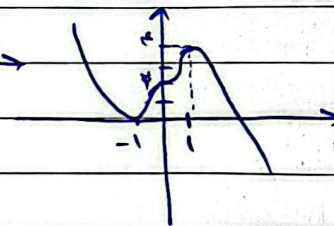
$\begin{matrix} 0^+ & 1 \\ -1 & -1 \\ 0^+ & 0^+ \end{matrix}$

ب) $\lim_{x \rightarrow 2} \frac{w(x)}{x - \lfloor x \rfloor}$

$x \rightarrow 2^+ \rightarrow \frac{x^2 - 4}{x - 2} = x + 2 \rightarrow 4 \rightarrow \lim_{x \rightarrow 2^+} w(x) = 4$
 $x \rightarrow 2^- \rightarrow \frac{x^2 - 3}{x - 1} = \frac{1}{1} = 1 \rightarrow \lim_{x \rightarrow 2^-} w(x) = 1$

ج) $y = -\frac{1}{2}x^3 + 3x^2, 2 \rightarrow y' = -\frac{3}{2}x^2 + 6x \rightarrow 1.5x^2(-x+4)$

$\begin{matrix} -1 & 0^+ & 1 \\ -1 & + & 1 \\ -1 & + & 1 \end{matrix}$



د) $y = x^3 - 3x^2 + 3 \rightarrow y' = 3x^2 - 6x \rightarrow 3x(x-2)$

$\begin{matrix} -1 & 0 & 1 \\ -1 & + & 1 \\ -1 & + & 1 \end{matrix}$

