

الف) $\lim_{x \rightarrow 2^+} \frac{2x+5}{x+1} \xrightarrow{x=2} \frac{4+5}{2+1} = 3$

$$\therefore \lim_{x \rightarrow 2^-} \frac{2x+5}{x+1} \xrightarrow{x=2} \frac{4+5}{2+1} = 3$$

$$c) \lim_{x \rightarrow 2} \frac{2x+5}{x+1} \xrightarrow{x=2} \frac{4+5}{2+1} = 3$$

$$c) \lim_{n \rightarrow \infty} \frac{2n+7}{[n^2]} \rightarrow \frac{2n+7}{[\infty]} = \frac{7}{\infty} \rightarrow 0 \quad \text{c.u.}$$

$$\lim_{x \rightarrow 3^-} 4[x] - 2 \xrightarrow{x=3^-} 4(2) - 2 = 6$$

$$b) \lim_{x \rightarrow 3^-} [4x-2] \xrightarrow{x=3^-} [4(3^-)-2] = [12^- - 2] = [10^-] = 9$$

$$c) \left[\lim_{x \rightarrow 3^-} 4x - 2 \right] \xrightarrow{x=3} [10] = 10 \quad ([4(3) - 2])$$

$$\Rightarrow \left[\lim_{x \rightarrow 3^+} 4x - 2 \right] \xrightarrow{x=3} [10] = 10 \quad ([4(3) - 2])$$

$$\text{الف) } \lim_{x \rightarrow 3^-} \frac{3[x]+1}{2} \Rightarrow \frac{3[3^-]+1}{2} = \frac{3(2)+1}{2} = \frac{7}{2}$$

$$\rightarrow \lim_{n \rightarrow 3^-} \left[\frac{3n+1}{2} \right] \rightarrow \left[\frac{3(3^-)+1}{2} \right] = \left[\frac{10^-}{2} \right] = [5^-] = 4$$

$$c) \left[\lim_{n \rightarrow 3^-} \frac{3n+1}{2} \right] \rightarrow \left[\frac{3(3)+1}{2} \right] = [5] = 5$$

$$c) \left[\lim_{n \rightarrow 3^+} \frac{3n+1}{2} \right] \rightarrow \left[\frac{3(3)+1}{2} \right] = [5] = 5$$

الف) $\lim_{x \rightarrow 1} \frac{x-5}{x^2-6x+5} = \frac{(x-5)}{(x-5)(x-1)} \rightarrow \frac{1}{+} \frac{5}{-} \frac{1}{+} \left\{ \begin{array}{l} + \rightarrow \frac{-4}{0^-} = +\infty \\ - \rightarrow \frac{-4}{0^+} = -\infty \end{array} \right\}$ حذارد

ب) $\lim_{x \rightarrow 3} \frac{x-4}{x^2-6x+9} = \frac{x-4}{(x-3)^2} \rightarrow \frac{3}{+0+} \begin{matrix} 3^+ \nearrow \frac{-1}{0^+} = -\infty \\ 3^+ \searrow \frac{-1}{0^+} = -\infty \end{matrix} \left. \begin{array}{l} \text{حرفا مختلف} \\ \text{درست برابر است} \end{array} \right\} \text{مقدار منفی نزاد پس محدود دارد.}$

الف) $\lim_{x \rightarrow -3} [-3x] - [5x] = \begin{matrix} -3^+ \\ -3^- \end{matrix} \begin{matrix} \nearrow \\ \searrow \end{matrix} \begin{matrix} [-3(-3^+)] - [5(-3^+)] = [9^-] - [-15^+] = 9 + 15 = 23 \\ [-3(-3^-)] - [5(-3^-)] = [9^+] - [-15^-] = 9 + 16 = 25 \end{matrix}$

$$\therefore \lim_{x \rightarrow (-\frac{1}{2})^-} \left[\frac{-1}{x+4} \right] = \left[\frac{-1}{\frac{1}{16}^+} \right] = [-16^-] = -17$$

الف) $\lim_{x \rightarrow 1} [4x^3 - 3x + 3]$

ب) $\lim_{x \rightarrow 0} [4x^3 - 3x + 3]$

$\lim_{x \rightarrow 2} \frac{x^3 - 8}{x^2 - 4}$ $\xrightarrow{2^+} \frac{8^+ - 8}{4^+ - 4} \rightarrow \frac{x^3 - 8}{x^2 - 4} = \frac{(x-2)(x^2 + 2x + 4)}{(x-2)(x+2)} = \frac{x^2 + 2x + 4}{x+2} = \frac{12}{4} = 3$
 $\xrightarrow{2^-} \frac{(x^3 - 8^-)}{x^2 - 4} = \frac{-(x-2)(x^2 + 2x + 4)}{(x-2)(x+2)} = \frac{-(x^2 + 2x + 4)}{x+2} = \frac{-12}{4} = -3$ } *محدد*

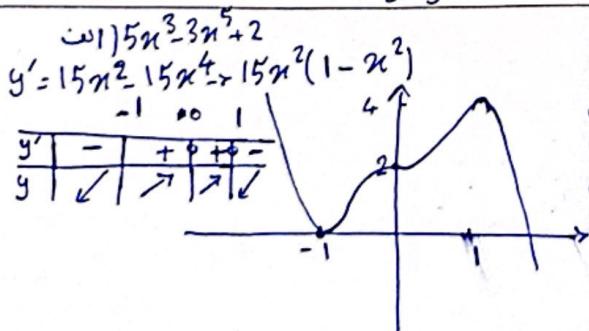
$\lim_{x \rightarrow \pi} \frac{|\sin x|}{\sin 2x}$ $\xrightarrow{\pi^+} \frac{-\sin x}{2\sin x \cos x} = \frac{-1}{2\cos x} \xrightarrow{x=\pi} \frac{-1}{2(-1)} = \frac{1}{2}$
 $\xrightarrow{\pi^-} \frac{\sin x}{2\sin x \cos x} = \frac{1}{2\cos x} \xrightarrow{x=\pi} \frac{1}{2(-1)} = -\frac{1}{2}$ } *محدد*

الف) $\lim_{x \rightarrow \frac{3\pi}{2}} \sqrt{\cos x}$ $\xrightarrow{\frac{3\pi}{2}^+} \sqrt{\cos \frac{3\pi}{2}^+} = 0$
 $\xrightarrow{\frac{3\pi}{2}^-} \sqrt{\cos \frac{3\pi}{2}^-} \rightarrow \cos \frac{3\pi}{2}^- < 0 \rightarrow \text{ن.ن.}$ } *محدد*

$\lim_{x \rightarrow 0} \sqrt{x - 2\sqrt{x}}$ $\xrightarrow{0^+} \sqrt{0 - 2\sqrt{0}} = 0$
 $\xrightarrow{0^-} x < 0 \rightarrow \text{ن.ن.}$ } *محدد*

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

ب) $\lim_{x \rightarrow 2} \frac{x^2 - \lfloor x^2 \rfloor}{x - \lfloor x \rfloor}$ $\xrightarrow{2^+} \frac{x^2 - \lfloor 2^+ \rfloor}{x - \lfloor 2^+ \rfloor} = \frac{x^2 - 4}{x - 2} = \frac{(x+2)(x-2)}{(x-2)} = 4$
 $\xrightarrow{2^-} \frac{x^2 - \lfloor 2^- \rfloor}{x - \lfloor 2^- \rfloor} = \frac{x^2 - 3}{x - 1} = 1$ } *محدد*



ب) $x^4 - 2x^2 + 3$
 $y' = 4x^3 - 4x = 4x(x^2 - 1)$

y'	-	+	-	+	-	+
y	↘	↗	↘	↗	↘	↗

