

$$\begin{aligned} \text{الف) } \lim_{x \rightarrow 2^+} \frac{2x+5}{x+1} &= \frac{2(2)+5}{2+1} = \boxed{3} & \text{ب) } \lim_{x \rightarrow 0} \frac{2x+7}{x^2} &= \boxed{\infty} \\ \text{ج) } \lim_{x \rightarrow 2^-} \frac{2x+5}{x+1} &= \frac{2(2)+5}{2+1} = \boxed{3} & \text{د) } \lim_{x \rightarrow 0} \frac{2x+7}{x^2} &= \boxed{\infty} \end{aligned}$$

نکته: این عبارت راه دقیقی ندارد

$$\begin{aligned} \text{الف) } \lim_{x \rightarrow 3^-} 4[x]-2 &= \lim_{x \rightarrow 3^-} 4(3^-)-2 = \boxed{10} \\ \text{ب) } \lim_{x \rightarrow 3^-} [4x-2] &= \lim_{x \rightarrow 3^-} [4 \times 3^- - 2] = [10^-] = \boxed{9} \\ \text{ج) } \lim_{x \rightarrow 3^-} [4x-2] &= [4 \times 3^- - 2] = \boxed{10} \\ \text{د) } \lim_{x \rightarrow 3^+} [4x-2] &= [4 \times 3^+ - 2] = \boxed{10} \end{aligned}$$

$$\begin{aligned} \text{الف) } \lim_{x \rightarrow 3^-} \frac{3[x]+1}{2} &= \frac{3(3^-)+1}{2} = \frac{3(2)+1}{2} = \boxed{\frac{7}{2}} \\ \text{ب) } \lim_{x \rightarrow 3^-} \left[\frac{3x+1}{2} \right] &= \left[\frac{3(3^-)+1}{2} \right] = [5^-] = \boxed{4} \\ \text{ج) } \lim_{x \rightarrow 3^-} \frac{3x+1}{2} &= \left[\frac{3 \times 3^- + 1}{2} \right] = \boxed{5} \\ \text{د) } \lim_{x \rightarrow 3^+} \frac{3x+1}{2} &= \left[\frac{3 \times 3^+ + 1}{2} \right] = \boxed{5} \end{aligned}$$

$$\begin{aligned} \text{الف) } \lim_{x \rightarrow 1^+} \frac{x-5}{x^2-4x+5} &= \frac{x-5}{(x-5)(x-1)} = \frac{1}{1^+-1} = \frac{1}{0^+} = +\infty \\ \text{ب) } \lim_{x \rightarrow 1^-} \frac{x-5}{x^2-4x+5} &= \frac{x-5}{(x-5)(x-1)} = \frac{1}{1^--1} = \frac{1}{0^-} = -\infty \end{aligned}$$

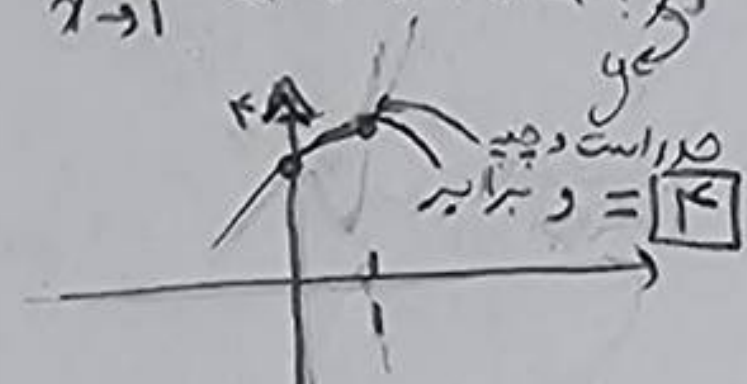
نکته: ندارد

$$\begin{aligned} \text{الف) } \lim_{x \rightarrow 3^+} \frac{x-4}{x^2-4x+9} &= \frac{x-4}{(x-3)^2} = \frac{0^+}{0^+} = +\infty, \quad \lim_{x \rightarrow 3^-} \frac{x-4}{x^2-4x+9} = \frac{x-4}{(x-3)^2} = \frac{0^-}{0^+} = -\infty \\ \text{ب) } \lim_{x \rightarrow 3^+} \frac{x-4}{x^2-4x+9} &= \frac{x-4}{(x-3)^2} = \frac{0^+}{0^+} = +\infty, \quad \lim_{x \rightarrow 3^-} \frac{x-4}{x^2-4x+9} = \frac{x-4}{(x-3)^2} = \frac{0^-}{0^+} = -\infty \end{aligned}$$

$$\begin{aligned} \text{الف) } \lim_{x \rightarrow 3^-} [-3x] - [5x] &= [9^-] - [-15^-] = 9 - (-14) = \boxed{23} \\ \lim_{x \rightarrow 3^+} [-3x] - [5x] &= [9^+] - [-15^+] = 9 - (-14) = \boxed{23} \\ \text{ب) } \lim_{x \rightarrow (-\frac{1}{4})^-} \left[\frac{-1}{x^4} \right] &= \frac{-1}{(\frac{1}{4})^4} = -(14)^+ = \boxed{-14} \end{aligned}$$

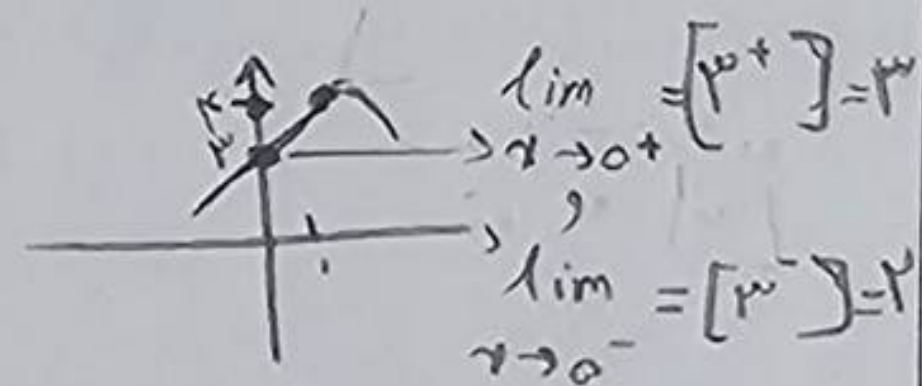
نکته: ندارد

الف) $\lim_{x \rightarrow 1} [(x^3 - 3x^2 + 3)] \Rightarrow y' = 12x^2 - 12x^2 = 12x^2(1-x)$



	-1	0	1
y'	+	0	-
y	↓	↑	↓
	3	2	1

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



موجود نیست

الف) $\lim_{x \rightarrow 2^+} \frac{|x^3 - 1|}{x^2 - 4} = \frac{x^3 - 1}{x^2 - 4} = \frac{(x-1)(x^2 + x + 1)}{(x-2)(x+2)} = \frac{12}{4} = 3$

ب) $\lim_{x \rightarrow 2^-} \frac{|x^3 - 1|}{x^2 - 4} = \frac{-x^3 + 1}{x^2 - 4} = \frac{-(x-1)(x^2 + x + 1)}{(x-2)(x+2)} = -\frac{12}{4} = -3$

موجود نیست

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

ب) $\lim_{x \rightarrow \pi^-} \frac{|\sin x|}{\sin 2x} = \frac{\sin x}{2 \sin x \cos x} = \frac{1}{2x-1} = \frac{1}{2}$

موجود نیست

الف) $\lim_{x \rightarrow \frac{\pi}{2}^+} \sqrt{\cos x} = \sqrt{0^+} = 0$ و $\lim_{x \rightarrow \frac{\pi}{2}^-} \sqrt{\cos x} = \sqrt{0^-} = 0$

موجود نیست

ب) $\lim_{x \rightarrow 0^+} \sqrt{x - 2\sqrt{x}} = (x - 2\sqrt{x}) > 0 \Rightarrow \sqrt{x}(\sqrt{x} - 2) > 0 \Rightarrow \sqrt{x} - 2 > 0 \Rightarrow x > 4 \Rightarrow$

موجود نیست

له زیر رادیکال منفی می شود

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

ب) $\lim_{x \rightarrow 2^+} \frac{x^2 - [x^2]}{x - [x]} = \frac{(x-2)(x+2)}{x-2} = x+2 = 4$

موجود است

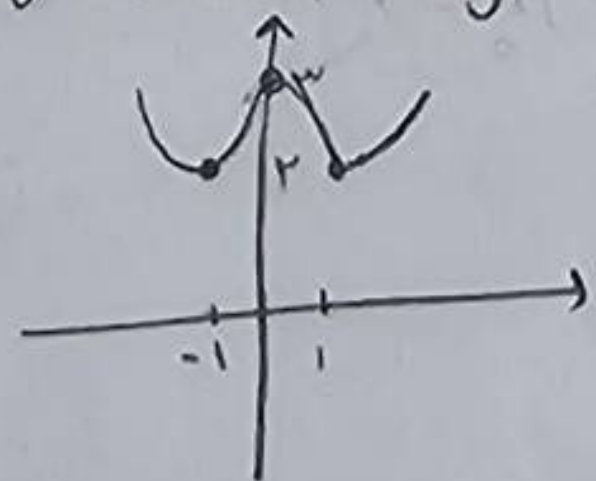
ج) $\lim_{x \rightarrow 2^-} \frac{x^2 - 3}{x - 1} = \frac{4 - 3}{2 - 1} = 1$

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



	-1	0	1
y'	-	0	+
y	↓	↑	↓
	0	2	1

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



	-1	0	1
y'	-	0	+
y	↓	↑	↓
	2	3	2