۱)

الف) $\lim_{x\to 2^+} \frac{2x+5}{x+1} = \frac{9}{3} = 3$

ب) $\lim_{x\to 2^-} \frac{2x+5}{x+1} = \frac{9}{3} = 3$

ج) $\lim_{x\to 2} \frac{2x+5}{x+1} = \frac{9}{3} = 3$

د) $\lim_{x\to 0} \frac{2x+7}{[x^2]} = \frac{2x+7}{0} \longrightarrow$ ت ن

۲)

الف) $\lim_{x\to 3^-} 4[x]-2 = 8-2 = 6$

ب) $\lim_{x\to 3^-} [4x-2] = 9$

ج) $\left[\lim_{x\to 3^-} 4x-2\right] = 10$

د) $\left[\lim_{x\to 3^+} 4x-2\right] = 10$

۳)

الف) $\lim_{x\to 3^-} \frac{3[x]+1}{2} = \frac{7}{2}$

ب) $\lim_{x\to 3^-} \left[\frac{3x+1}{2}\right] = 4$

ج) $\left[\lim_{x\to 3^-} \frac{3x+1}{2}\right] = 5$

د) $\left[\lim_{x\to 3^+} \frac{3x+1}{2}\right] = 5$

۴)

الف) $\lim_{x\to 1} \frac{x-5}{x^2-4x+5} = \lim_{x\to 1} \frac{1}{x-1}$

$1^+ : \frac{1}{0^+} = +\infty$

$1^- : \frac{1}{0^-} = -\infty$

ب) $\lim_{x\to 3} \frac{x-4}{(x-3)^2} \longrightarrow 3^+ : \frac{-1}{0^+} = -\infty$

$\hookrightarrow 3^- : \frac{-1}{0^+} = -\infty$

۵)

الف) $\lim_{x\to -3} [-3x] - [5x] \longrightarrow -3^+ : 10 + 15 = 25$

$\hookrightarrow -3^- : 9 + 14 = 23$

ب) $\lim_{x\to (-\frac{1}{2})^-} \left[\frac{-1}{x^4}\right] = -14$

$x < -\frac{1}{2} \longrightarrow x^4 > \frac{1}{14} \longrightarrow \frac{1}{x^4} < 14 \longrightarrow \frac{-1}{x^4} > -14 \rightarrow$

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

۶)

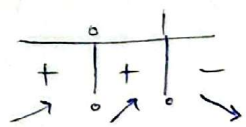
الف) $\lim_{x\to 1} [4x^3 - 3x^4 + 3] = 3$

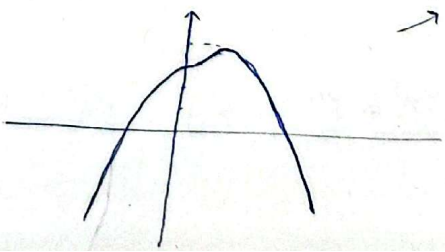
ب) $\lim_{x\to 0} [4x^3 - 3x^4 + 3] \longrightarrow 0^+ : 3$

$\hookrightarrow 0^- : 2$

$y = -3x^4 + 4x^3 + 3 \rightarrow y' = -12x^3 + 12x^2$

$y' = -12x^2(x-1)$





(۷

الف) $\lim\limits_{x\to 2} \dfrac{|x^3-8|}{x^2-4}$

2^+: $\dfrac{|x-2||x^2+4+2x|}{(x-2)(x+2)} = \dfrac{|x^2+4+2x|}{x+2} = \dfrac{12}{4} = 3$

2^-: $\dfrac{-|x-2||x^2+4+2x|}{(x-2)(x+2)} = \dfrac{-|x^2+2x+4|}{x+2} = -\dfrac{12}{4} = -3$

ب) $\lim\limits_{x\to \pi} \dfrac{|\sin x|}{\sin 2x}$

π^+: $\dfrac{|\sin x|}{2\sin x\cos x} = \dfrac{-1}{2\cos x} = \dfrac{-1}{-2} = \dfrac{1}{2}$

π^-: $\dfrac{|\sin x|}{2\sin x\cos x} = \dfrac{1}{2\cos x} = -\dfrac{1}{2}$

(۸

الف) $\lim\limits_{x\to \frac{3\pi}{2}} \sqrt{\cos x}$

$\left(\frac{3\pi}{2}\right)^+$: 0

$\left(\frac{3\pi}{2}\right)^-$: ت ن

ب) $\lim\limits_{x\to 0} \sqrt{x-2\sqrt{x}}$

0^+ : $x-2\sqrt{x} \geq 0 \to \sqrt{x}(\sqrt{x}-2) \geq 0 \to$

0		4	
+	−	+	

$\to 0^+$ (در دامنه نیست) ت ن

0^- : ت ن

(۹

الف) $\lim\limits_{x\to 0^+} \dfrac{(-1)^{[\sin x]}}{x^2(x-1)} = \dfrac{(-1)^0}{x^2(x-1)} = \dfrac{1}{x^2(x-1)} = \dfrac{1}{0^-} = -\infty$

ب) $\lim\limits_{x\to 2} \dfrac{x^2-[x^2]}{x-[x]}$

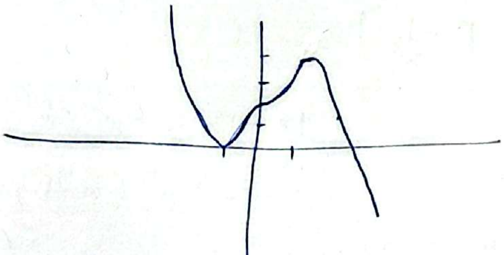
2^+: $\dfrac{x^2-4}{x-2} = x+2 = 4$

2^-: $\dfrac{x^2-4}{x-1} = 0$

(۱۰

الف) $y = -3x^5+5x^3+2 \to y' = -15x^4+15x^2 \to -15x^2(x^2-1) \to$

	−1		0		1	
−		+		+		−
↘		↗		↗		↘



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

	−1		0		1	
−		+		−		+
↘		↗		↘		↗