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

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

$$\text{ج) } \lim_{x \rightarrow 0} \frac{x+5}{x^2} \rightarrow 3$$

$$\text{د) } \lim_{x \rightarrow 0} \frac{x+5}{[x^2]} \rightarrow \begin{cases} 1 \rightarrow \frac{2(0)+5}{[(0)^2]} = \infty \\ -1 \rightarrow \frac{2(0)+5}{[(0)^2]} = \infty \end{cases}$$

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$$\text{الف) } \lim_{x \rightarrow 3^-} f(x) - 2 \rightarrow f(3^-) - 2 = f(2) - 2 = 6$$

$$\text{ب) } \lim_{x \rightarrow 3^-} [f(x) - 2] \rightarrow [f(3^-) - 2] = [11 - 2] = 9$$

$$\text{ج) } \left[\lim_{x \rightarrow 3^-} f(x) - 2 \right] = [10] = 10$$

$$\text{د) } \left[\lim_{x \rightarrow 3^+} f(x) - 2 \right] = [10] = 10$$

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$$\text{الف) } \lim_{x \rightarrow 0} \frac{f(x)+1}{x} = \frac{f(0^-)+1}{0} = \frac{f(0)+1}{0} = \frac{5}{0}$$

$$\text{ب) } \lim_{x \rightarrow 0} \left[\frac{f(x)+1}{x} \right] \Rightarrow \left[\frac{f(0^-)+1}{0} \right] \Rightarrow [5] = 5$$

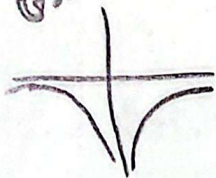
$$\text{ج) } \left[\lim_{x \rightarrow 0} \frac{f(x)+1}{x} \right] = [5] = 5$$

$$\text{د) } \left[\lim_{x \rightarrow 0^+} \frac{f(x)+1}{x} \right] = [5] = 5$$

$$\begin{aligned}
 \text{a) } \lim_{x \rightarrow 1} \frac{(x-2)}{(x-1)(x-0)} &= \lim_{x \rightarrow 1} \frac{1}{x-1} \begin{cases} \nearrow \frac{1}{0^+} = +\infty \\ \searrow \frac{1}{0^-} = -\infty \end{cases} \\
 \text{b) } \lim_{x \rightarrow 2} \frac{(x-2)}{(x-2)^2} &= \frac{-1}{(x-2)^2} = \frac{-1}{0^+} = -\infty
 \end{aligned}$$

$$\begin{aligned}
 \text{a) } \lim_{x \rightarrow -1} [-3x] - [5x] &\xrightarrow{-1^+} [-3(-1)] - [5(-1)] = 1 - (-5) = 6 \\
 &\xrightarrow{-1^-} [-3(-1)] - [5(-1)] = 1 - (-5) = 6
 \end{aligned}$$

$$\text{b) } \lim_{x \rightarrow (-\frac{1}{2})^-} \left[\frac{-1}{x^2} \right] = \left[\frac{-1}{(-\frac{1}{2})^2} \right] = [-4] = -4$$



$$\begin{aligned}
 \text{a) } \lim_{x \rightarrow 1} [x^3 - 3x^2] + 3 &\xrightarrow{1^+} [(1-3)] + 3 = [-2] + 3 = 1 \\
 &\xrightarrow{1^-} [(1-3)] + 3 = [-2] + 3 = 1
 \end{aligned}$$

$$f(x) = 1x^3 - 3x^2$$

$$\begin{aligned}
 1x^3(1-x) &\xrightarrow{0^+} \frac{0}{+1} = 0 \\
 &\xrightarrow{0^-} \frac{0}{-1} = 0
 \end{aligned}$$

$$\begin{aligned}
 \text{b) } \lim_{x \rightarrow 0} [x^3 - 3x^2] + 3 &\xrightarrow{0^+} [0^+ - 3] + 3 = [-3] + 3 = 0 \\
 &\xrightarrow{0^-} [0^- - 3] + 3 = [-3] + 3 = 0
 \end{aligned}$$

$$\begin{aligned}
 f(x) &= 1x^3 - 3x^2 \\
 1x^3(1-x) &\xrightarrow{0^+} \frac{0}{+1} = 0 \\
 &\xrightarrow{0^-} \frac{0}{-1} = 0
 \end{aligned}$$

$$\begin{aligned}
 \text{a) } \lim_{x \rightarrow 2} \frac{x^2 - 4}{x^2 - 4} &= \frac{(x-2)(x+2)}{(x-2)(x+2)} \xrightarrow{2^+} \frac{(2-2)(2+2)}{(2-2)(2+2)} = \frac{0}{0} \\
 &\xrightarrow{2^-} \frac{(2-2)(2+2)}{(2-2)(2+2)} = \frac{0}{0}
 \end{aligned}$$

$$\begin{aligned}
 \text{b) } \lim_{x \rightarrow \pi} \frac{\sin x}{x \sin x} &\xrightarrow{\pi^+} \frac{-1}{\pi \cdot 0^+} = -\frac{1}{\pi} \\
 &\xrightarrow{\pi^-} \frac{-1}{\pi \cdot 0^-} = \frac{1}{\pi}
 \end{aligned}$$

نور المولى

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

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ب) $\lim_{x \rightarrow 0} \sqrt{x - 2\sqrt{x}} \Rightarrow \sqrt{\sqrt{x}(\sqrt{x} - 2)}$
 $\sqrt{x} = t, t > 0 \rightarrow \sqrt{t(t-2)}$
 $\frac{0}{0} \rightarrow \frac{0}{0} \rightarrow \frac{0}{0} \rightarrow \frac{0}{0}$
 حریف و راس به راس
 تعریف نمی شود

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

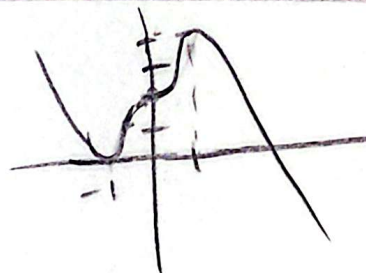
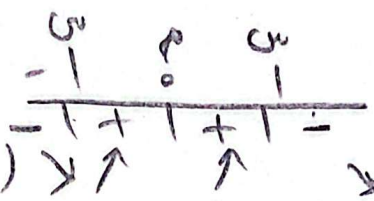
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ب) $\lim_{x \rightarrow 2} \frac{x^2 \lfloor x^2 \rfloor}{x - \lfloor x \rfloor}$
 $\frac{2^+}{2^-} \rightarrow \frac{2^2 - \epsilon}{2 - 2} = \frac{4 - \epsilon}{0} = \frac{4 - \epsilon}{0} = \epsilon$
 $\frac{2^-}{2^-} \rightarrow \frac{2^2 - \epsilon}{2 - 2} = \frac{4 - \epsilon}{0} = \frac{4 - \epsilon}{0} = 1$

الف) $y = 2x^3 - 3x^2 + 2$

$y' = 6x^2 - 6x$

$y' = 6x^2(1+x)(1-x)$

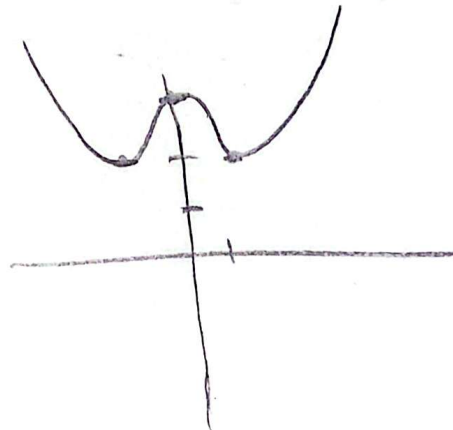
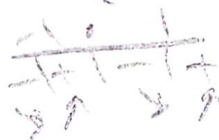


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ب) $y = x^3 - 2x^2 + 2$

$y' = 3x^2 - 4x$

$y' = x(x-4)$



نمودارهای تکلیف ۱۸