

نام و نام خانوادگی: پاسخنامه تشریحی تکلیف شماره ۱۸۰۰ کلاس: نام و نام خانوادگی: A

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

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

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

د) $\lim_{x \rightarrow 0} \frac{2x+V}{[x^2]}$ $\begin{matrix} \nearrow \frac{0^++V}{[0^+]} = \frac{V^+}{0^+} \text{ تن} \\ \searrow \frac{0^-+V}{[0^+]} = \frac{V^-}{0^+} \text{ تن} \end{matrix}$ حد ندارد. ✓

(۲)

الف) $\lim_{x \rightarrow 2^-} 4[x] - 2 = 4[2^-] - 2 = 4 \times 1 - 2 = 2$ ✓

ب) $\lim_{x \rightarrow 2^-} [4x - 2] = [4 \times (2^-) - 2] = [10^-] = 9$ ✓

ج) $\lim_{x \rightarrow 2^-} 4x - 2 = 10 \rightarrow [\lim_{x \rightarrow 2^-} 4x - 2] = [10] = 10$ ✓

د) $\lim_{x \rightarrow 2^+} 4x - 2 = 10 \rightarrow [\lim_{x \rightarrow 2^+} 4x - 2] = [10] = 10$ ✓

(۲)

الف) $\lim_{x \rightarrow 2^-} \frac{3[x]+1}{y} = \frac{3[2^-]+1}{y} = \frac{3 \times 1 + 1}{y} = \frac{4}{y}$ ✓

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

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

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

(۲)

الف) $\lim_{x \rightarrow 1} \frac{x-5}{x^2-4x+5} = \frac{x-5}{(x-1)(x-5)} = \frac{1}{x-1}$ $\begin{matrix} \nearrow \frac{1}{0^+} = +\infty \\ \searrow \frac{1}{0^-} = -\infty \end{matrix}$ حد ندارد. ✓

ب) $\lim_{x \rightarrow 2} \frac{x-4}{x^2-4x+9} = \frac{x-4}{(x-2)^2}$ $\begin{matrix} \nearrow \frac{-1}{0^+} = -\infty \\ \searrow \frac{-1}{0^+} = -\infty \end{matrix}$ حد ندارد. ✓

(۲)

الف) $\lim_{x \rightarrow 2} [-3x] - [5x]$ $\begin{matrix} \nearrow -10 - 10 = -20 \\ \searrow -9 - 14 = -23 \end{matrix}$ حد ندارد.

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

(۱)

$\lim_{x \rightarrow -2} [-3x] - [5x] = \begin{cases} \lim_{x \rightarrow (-2)^+} [-3x] - [5x] = 1 - (-10) = 11 \\ \lim_{x \rightarrow (-2)^-} [-3x] - [5x] = 9 - (-14) = 23 \end{cases}$

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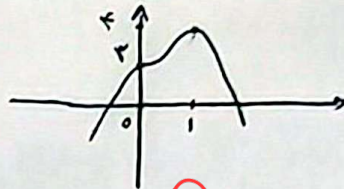
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الف) $\lim_{x \rightarrow 1} [4x^3 - 3x^4 + 3] = [4 - 3] = \boxed{1}$ ✓

$y' = 12x^2 - 12x^3$

Sign chart for y' at $x=1$: $+$ 0 $+$ 0 $+$



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

From right: $[3^+] = 3$
From left: $[3^-] = 3$
✓ $\lim_{x \rightarrow 0} = 3$ (no jump)

الف) $\lim_{x \rightarrow 2} \frac{|x^3 - 8|}{x^3 - 4}$

From right: $\frac{x^3 - 8}{x^3 - 4} = \frac{(x-2)(x^2+2x+4)}{(x-2)(x+2)} = \frac{x^2+2x+4}{x+2} \rightarrow \frac{4+4+4}{4} = \frac{12}{4} = 3$
From left: $\frac{-(x^3 - 8)}{x^3 - 4} = \frac{-(x-2)(x^2+2x+4)}{(x-2)(x+2)} = \frac{-(x^2+2x+4)}{x+2} \rightarrow \frac{-4-4-4}{4} = \frac{-12}{4} = -3$
✓ $\lim_{x \rightarrow 2} \text{ does not exist. (no jump)}$

ب) $\lim_{x \rightarrow \pi} \frac{|\sin x|}{\sin 2x}$

From right: $\frac{\sin x}{\sin 2x} = \frac{\sin x}{2 \sin x \cos x} = \frac{1}{2 \cos x} \rightarrow \frac{1}{2(-1)} = -\frac{1}{2}$
From left: $\frac{-\sin x}{\sin 2x} = \frac{-\sin x}{2 \sin x \cos x} = \frac{-1}{2 \cos x} \rightarrow \frac{-1}{2(-1)} = \frac{1}{2}$
✓ $\lim_{x \rightarrow \pi} \text{ does not exist. (no jump)}$

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

From right: $\sqrt{0^+} = 0^+$
From left: $\sqrt{0^-}$ is not real.
✓ $\lim_{x \rightarrow \frac{\pi}{2}} \text{ does not exist. (no jump)}$

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

From right: $\sqrt{0^+ - 2\sqrt{0^+}} = \sqrt{0^-}$ is not real.
From left: $\sqrt{0^- - 2\sqrt{0^-}}$ is not real.
✓ $\lim_{x \rightarrow 0} \text{ does not exist. (no jump)}$

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

$\frac{(-1)^{[0^+]}}{x^3 - x^2} = \frac{(-1)^0}{x^3 - x^2} = \frac{1}{x^3 - x^2} = \frac{1}{x^2(x-1)} \rightarrow \frac{1}{0^+ \times (-1)^+} = \frac{1}{0^-} = -\infty$
✓ $\lim_{x \rightarrow 0^+} \text{ does not exist. (no jump)}$

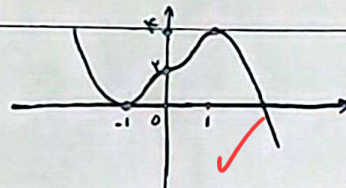
ب) $\lim_{x \rightarrow 2} \frac{x^3 - [x^3]}{x - [x]}$

From right: $\frac{x^3 - [x^3]}{x - [x]} = \frac{x^3 - 4}{x - 2} = x^2 + 2x + 4 \rightarrow 4 + 4 + 4 = 12$
From left: $\frac{x^3 - [x^3]}{x - [x]} = \frac{x^3 - 3}{x - 1} = \frac{(2^-)^3 - 3}{2^- - 1} = \frac{1^- - 3}{1^-} = \frac{-2}{1^-} = 2$
✓ $\lim_{x \rightarrow 2} \text{ does not exist. (no jump)}$

الف) $y = 5x^3 - 2x^5 + 2$

$y' = -15x^4 + 15x^2$

Sign chart for y' : $-$ 0 $+$ 0 $+$ 0 $-$



ب) $y = x^4 - 2x^2 + 3$

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

Sign chart for y' : $-$ 0 $+$ 0 $-$ $+$

