

الف) $\lim_{x \rightarrow 2^+} f(x) - 3 = f(2) - 3 = 5$

ب) $\lim_{x \rightarrow 2^-} f(x) - 3 = f(2) - 3 = 5$

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الف) $\lim_{x \rightarrow 2^+} f[x] - 3 \xrightarrow{[r^+] = 2} f(2) - 3 = 5$

ب) $\lim_{x \rightarrow 2^-} f[x] - 3 \xrightarrow{[r^-] = 1} f(1) - 3 = 1$

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الف) $\lim_{x \rightarrow 2^+} [f(x) - 3] = \lim_{x \rightarrow 2^+} [f(x)] - 3 = \lim_{x \rightarrow 2^+} [A^+] - 3 = 5$

ب) $\lim_{x \rightarrow 2^-} [f(x) - 3] = \lim_{x \rightarrow 2^-} [f(x)] - 3 = \lim_{x \rightarrow 2^-} [A^-] - 3 = 4$

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الف) $\left[\lim_{x \rightarrow 2^+} f(x) - 3 \right] = [f(2) - 3] = [5] = 5$

ب) $\left[\lim_{x \rightarrow 2^-} f(x) - 3 \right] = [f(2) - 3] = [5] = 5$

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الف) $\lim_{x \rightarrow 2} \frac{f(x) - 3}{x - 2} = \frac{9}{0^0} = \begin{cases} \lim_{x \rightarrow 2^+} \frac{f(x) - 3}{x - 2} = \frac{9}{0^+} = +\infty \\ \lim_{x \rightarrow 2^-} \frac{f(x) - 3}{x - 2} = \frac{9}{0^-} = -\infty \end{cases}$

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ب) $\lim_{x \rightarrow 2} \frac{f(x) - 3}{(x - 2)^2} = \frac{9}{0^0} = \begin{cases} \lim_{x \rightarrow 2^+} \frac{f(x) - 3}{(x - 2)^2} = \frac{9}{0^+} = +\infty \\ \lim_{x \rightarrow 2^-} \frac{f(x) - 3}{(x - 2)^2} = \frac{9}{0^+} = +\infty \end{cases}$

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الف) $\lim_{x \rightarrow 2} \frac{f(x) - 4}{\sqrt{x} - 2} = \frac{0}{0}$ $\lim_{x \rightarrow 2^+} \frac{f(x) - 4}{\sqrt{x} - 2} = \frac{9}{\sqrt{0^+}} = \frac{9}{0^+} = +\infty$
 $\lim_{x \rightarrow 2^-} \frac{f(x) - 4}{\sqrt{x} - 2} = \frac{9}{\sqrt{0^-}} = -\infty$ حد ندارد

ب) $\lim_{x \rightarrow 2} \frac{f(x) - 4}{\sqrt{x^2 - 4x + 4}} = \frac{9}{0}$ $\lim_{x \rightarrow 2^+} \frac{f(x) - 4}{\sqrt{x^2 - 4x + 4}} = \frac{9}{\sqrt{0^+}} = \frac{9}{0^+} = +\infty$
 $\lim_{x \rightarrow 2^-} \frac{f(x) - 4}{\sqrt{x^2 - 4x + 4}} = \frac{9}{\sqrt{0^-}} = -\infty$ حد ندارد

الف) $\lim_{x \rightarrow 2} \frac{f(x) - 4}{x^2 - \sqrt{x} + 1} = \frac{9}{0}$ $\lim_{x \rightarrow 2^+} \frac{f(x) - 4}{x^2 - \sqrt{x} + 1} = \frac{9}{0^+} = +\infty$
 $\lim_{x \rightarrow 2^-} \frac{f(x) - 4}{x^2 - \sqrt{x} + 1} = \frac{9}{0^-} = -\infty$ حد ندارد

ب) $\lim_{x \rightarrow 2} \frac{f(x) - 4}{[x - 2]} = \frac{9}{0}$ $\lim_{x \rightarrow 2^+} \frac{f(x) - 4}{[x - 2]} = \frac{9}{[0^+]} = \frac{9}{0} = \text{نشان } x$
 $\lim_{x \rightarrow 2^-} \frac{f(x) - 4}{[x - 2]} = \frac{9}{[0^-]} = \frac{9}{-1} = -9$ حد ندارد

الف) $\lim_{x \rightarrow 3} [3x] + [-2x] = [9^+] + [-6^-] = 9 + (-6) = 3$ حد دارد
 $\lim_{x \rightarrow 3^-} [3x] + [-2x] = [9^-] + [-6^+] = 8 + (-6) = 2$ حد دارد
 ب) $\lim_{x \rightarrow -4} [-4x] + [2x] = [16^-] + [-8^+] = 16 - 8 = 8$ حد دارد
 $\lim_{x \rightarrow -4^+} [-4x] + [2x] = [16^+] + [-8^-] = 16 - 7 = 9$ حد دارد

الف) $\lim_{x \rightarrow 2} [x^2 - 4x] = [4^+] = 4$ حد دارد
 $\lim_{x \rightarrow 2^-} [x^2 - 4x] = [4^-] = 3$ حد دارد

ب) $\lim_{x \rightarrow 3} [4x - x^2] = [12^+] = 12$ حد دارد
 $\lim_{x \rightarrow 3^-} [4x - x^2] = [12^-] = 11$ حد دارد

الف) $\lim_{x \rightarrow 2} \frac{|x-2|}{x^2 - 3x + 2} = \frac{0}{0}$ $\lim_{x \rightarrow 2^+} \frac{|x-2|}{x^2 - 3x + 2} = \frac{x-2}{(x-1)(x-2)} = \frac{1}{x-1} = \frac{1}{1} = 1$
 $\lim_{x \rightarrow 2^-} \frac{|x-2|}{x^2 - 3x + 2} = \frac{2-x}{(x-1)(x-2)} = \frac{-1}{x-1} = \frac{-1}{1} = -1$ حد ندارد

ب) $\lim_{x \rightarrow 1} \frac{x - [x]}{x^2 - 1} = \frac{0}{0}$ $\lim_{x \rightarrow 1^+} \frac{x - [x]}{x^2 - 1} = \frac{x-1}{x^2-1} = \frac{1}{x+1} = \frac{1}{2}$ حد ندارد
 $\lim_{x \rightarrow 1^-} \frac{x - [x]}{x^2 - 1} = \frac{x}{x^2-1} = \frac{1}{0^-} = -\infty$