

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

$$\text{الف) } \lim_{x \rightarrow 2^+} f(x) - 3 = f(2^+) - 3 = 1 \quad \text{ب) } \lim_{x \rightarrow 2^-} f(x) - 3 = f(2^-) - 3 = 1$$

$$\text{الف) } \lim_{x \rightarrow 2^+} [f(x) - 3] \rightarrow x > 2 \rightarrow f(x) > 1 \rightarrow f(x) - 3 > -2 \Rightarrow \lim_{x \rightarrow 2^+} [f(x) - 3] = -1$$

$$\text{ب) } \lim_{x \rightarrow 2^-} [f(x) - 3] \rightarrow x < 2 \rightarrow f(x) < 1 \rightarrow f(x) - 3 < -2 \Rightarrow \lim_{x \rightarrow 2^-} [f(x) - 3] = -1$$

$$\text{الف) } \left[\lim_{x \rightarrow 2^+} (x-3) \right] = [2-3] = [-1] = -1$$

$$\text{ب) } \left[\lim_{x \rightarrow 2^-} (x-3) \right] = [2-3] = [-1] = -1$$

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

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

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الف) $\lim_{n \rightarrow 3} \frac{f(n-3)}{\sqrt{n-3}}$ $\xrightarrow{\mu^+} \frac{f(n-3)}{\sqrt{0^+}} = \frac{9}{0^+} = +\infty$ -4
 $\xrightarrow{\mu^-} \frac{f(n-3)}{\sqrt{0^-}} = \frac{9}{0^-} = -\infty$ که ندارد

ب) $\lim_{n \rightarrow 3} \frac{f(n-3)}{\sqrt{n^2 - 3n + 3}}$ $\rightarrow \frac{1}{1+3-3+3} = \frac{1}{4}$
 $\xrightarrow{\mu^+} \frac{f(n-3)}{\sqrt{0^+}} = \frac{9}{0^+} = +\infty$
 $\xrightarrow{\mu^-} \frac{f(n-3)}{\sqrt{0^-}} = \frac{9}{0^-} = -\infty$ که ندارد

الف) $\lim_{n \rightarrow 3} \frac{f(n-3)}{n^2 - \sqrt{n+1}}$ $\rightarrow (n-3)(n-3) \rightarrow \frac{1}{1+3-3+3} = \frac{1}{4}$
 $\xrightarrow{\mu^+} \frac{9}{0^+} = +\infty$
 $\xrightarrow{\mu^-} \frac{9}{0^-} = -\infty$ -7
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ب) $\lim_{n \rightarrow 3} \frac{f(n-3)}{[n-3]}$
 $\xrightarrow{\mu^+} \frac{9}{0} \rightarrow \text{ت.ن}$
 $\xrightarrow{\mu^-} \frac{9}{-1} = -9$ که ندارد

الف) $\lim_{n \rightarrow 3} [2n] + [-n]$
 $\xrightarrow{\mu^+} n > 3 \rightarrow 3n > 9, n > 3 \rightarrow -n < -3 \Rightarrow 9 - 3 = 6$
 $\xrightarrow{\mu^-} n < 3 \rightarrow 3n < 9, n < 3 \rightarrow -n > -3 \Rightarrow 9 - 3 = 6$ -1

ب) $\lim_{n \rightarrow -4} [-2n] + [2n]$
 $\xrightarrow{\mu^+} n > -4 \rightarrow -2n < 8, n > -4 \rightarrow 2n > -8 \Rightarrow 8 - 8 = 0$
 $\xrightarrow{\mu^-} n < -4 \rightarrow -2n > 8, n < -4 \rightarrow 2n < -8 \Rightarrow 8 - 8 = 0$ -9

الف) $\lim_{n \rightarrow 2} [n^2 - 2n] = \lim_{n \rightarrow 2} [n(n-2)]$
 $\xrightarrow{\mu^+} [2, 1] (2, 1 = 4) = [0^-] = 0$
 $\xrightarrow{\mu^-} [1, 0] (1, 0 = 4) = [0^-] = 0$ -9

ب) $\lim_{n \rightarrow 3} [4n - n^2] = \lim_{n \rightarrow 3} [n(4-n)]$
 $\xrightarrow{\mu^+} [3, 1] (4 - 3 = 1) = [0^+] = 0$
 $\xrightarrow{\mu^-} [2, 2] (4 - 2 = 2) = [0^+] = 0$

الف) $\lim_{n \rightarrow 2} \frac{|n-2|}{n^2 - 2n + 2}$

$$\begin{aligned} & \nearrow_{2^+} \frac{(n-2)}{(n-2)(n-1)} = \frac{1}{n-1} = \frac{1}{1} = 1 \\ & \searrow_{2^-} \frac{-(n-2)}{(n-2)(n-1)} = \frac{-1}{n-1} = \frac{-1}{1} = -1 \end{aligned}$$

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ب) $\lim_{n \rightarrow 1} \frac{n - [n]}{n^2 - 1}$

$$\begin{aligned} & \nearrow_{1^+} \frac{n-1}{n^2-1} = \frac{1}{n+1} = \frac{1}{2} \\ & \searrow_{1^-} \frac{n-0}{n^2-1} = \frac{1}{0^-} = -\infty \end{aligned}$$

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