

نصف اول رانی، باز هم در صورت تکلیف ۲۹: "سنا حنا"

الف) $\lim_{x \rightarrow 2^+} f(x) = 3 \rightarrow f(2) = 3 \in \mathbb{Q}$ (5) -1

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

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

الف) $\lim_{x \rightarrow 2^+} [f(x) - 3] \rightarrow [f(2^+) - 3] = [3] = \mathbb{Q}$ ب) $\lim_{x \rightarrow 2^-} [f(x) - 3] = [f(2^-) - 3] = [3] = \mathbb{Q}$ (5) -4

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

الف) $\lim_{x \rightarrow 3} \frac{f(x) - 3}{x - 3}$ $\left\{ \begin{array}{l} \mu^+ \rightarrow \frac{f(3) - 3}{3 - 3} = \frac{9}{0^+} = +\infty \\ \mu^- \rightarrow \frac{f(3) - 3}{3 - 3} = \frac{9}{0^-} = -\infty \end{array} \right\}$ جزایر ب) $\lim_{x \rightarrow 3} \frac{f(x) - 3}{(x-3)^2}$ $\left\{ \begin{array}{l} \mu^+ \rightarrow \frac{9}{0^+} = +\infty \\ \mu^- \rightarrow \frac{9}{0^+} = +\infty \end{array} \right\}$ جزایر (5) -6

الف) $\lim_{x \rightarrow 3} \frac{f(x) - 3}{\sqrt{x} - 3}$ $\left\{ \begin{array}{l} \mu^+ \rightarrow \frac{f(3) - 3}{\sqrt{3} - 3} = \frac{9}{0^+} = +\infty \\ \mu^- \rightarrow \frac{f(3) - 3}{\sqrt{3} - 3} = \frac{9}{0^-} = -\infty \end{array} \right\}$ جزایر (5) -7

ب) $\lim_{x \rightarrow 3} \frac{f(x) - 3}{\sqrt{x^2 - 4x + 3}}$ $\left\{ \begin{array}{l} \mu^+ \rightarrow \frac{f(3) - 3}{\sqrt{3^2 - 4(3) + 3}} = \frac{9}{0^+} = +\infty \\ \mu^- \rightarrow \frac{f(3) - 3}{\sqrt{(\mu^-)^2 - 4(\mu^-) + 3}} = \frac{9}{0^-} = -\infty \end{array} \right\}$ جزایر (5) -8

الف) $\lim_{x \rightarrow 3} \frac{f(x) - 3}{x^2 - 7x + 12}$ $\left\{ \begin{array}{l} \mu^+ \rightarrow \frac{f(3) - 3}{(\mu^+ - 3)(\mu^+ - 4)} = \frac{9}{(0^+)(-1)} = \frac{9}{0^-} = -\infty \\ \mu^- \rightarrow \frac{f(3) - 3}{(\mu^- - 3)(\mu^- - 4)} = \frac{9}{(0^-)(-1)} = \frac{9}{0^+} = +\infty \end{array} \right\}$ جزایر (5) -9

ب) $\lim_{x \rightarrow 3} \frac{f(x) - 3}{[x - 3]}$ $\left\{ \begin{array}{l} \mu^+ \rightarrow \frac{f(3) - 3}{[\mu^+ - 3]} = \frac{9 - 3}{[0^+]} = \frac{6}{0} = \infty \\ \mu^- \rightarrow \frac{f(3) - 3}{[\mu^- - 3]} = \frac{9 - 3}{[0^-]} = \frac{6}{-1} = -6 \end{array} \right\}$ جزایر (5) -10

الف) $\lim_{x \rightarrow 3} [f(x) + [-f(x)]] \xrightarrow{\mu^+} [f(\mu^+)] + [-f(\mu^+)] = [9^+] + [-9^+] = 9 - 9 = 0 \in \mathbb{Z}$ $\xrightarrow{\mu^-} [f(\mu^-)] + [-f(\mu^-)] = [9^-] + [-9^-] = 9 - 9 = 0 \in \mathbb{Z}$ (2) ✓

ب) $\lim_{x \rightarrow -4} [-f(x)] + [f(x)] \xrightarrow{-4^+} [-f(-4^+)] + [f(-4^+)] = [4\epsilon^-] + [-12\epsilon^+] = 4\epsilon^- - 12\epsilon^+ \in \mathbb{R}$ $\xrightarrow{-4^-} [-f(-4^-)] + [f(-4^-)] = [4\epsilon^+] + [-12\epsilon^-] = 4\epsilon^+ - 12\epsilon^- \in \mathbb{R}$ (5) ✓

الف) $\lim_{x \rightarrow 2} [x^2 - \varepsilon x]$ $\xrightarrow{2^+}$ $[(2.1)^2 - f(2.1)] = [-1.99] = -\varepsilon$
 $\xrightarrow{2^-}$ $[(1.9)^2 - f(1.9)] = [-1.99] = -\varepsilon$ } صحیح است \downarrow $(-\varepsilon) \checkmark$ -9

ب) $\lim_{x \rightarrow 2} [4x - x^2]$ $\xrightarrow{2^+}$ $[4(2.1) - (2.1)^2] = [1.99] = 1$
 $\xrightarrow{2^-}$ $[4(1.9) - (1.9)^2] = [1.99] = 1$ } صحیح است \downarrow $(1) \checkmark$ 9

الف) $\lim_{x \rightarrow 2} \frac{|x-2|}{x^2 x + 2}$ $\xrightarrow{2^+}$ $\frac{x-2}{(x-2)(x-1)} = \frac{1}{x-1} = \frac{1}{2-1} = 1$
 $\xrightarrow{2^-}$ $\frac{-(x-2)}{(x-2)(x-1)} = \frac{-1}{x-1} = \frac{-1}{2-1} = -1$ } صحیح است \rightarrow -10

ب) $\lim_{x \rightarrow 1} \frac{x - [x]}{x^2 - 1}$ $\xrightarrow{1^+}$ $\frac{x - [1^+]}{x^2 - 1} = \frac{x-1}{(x-1)(x+1)} = \frac{1}{x+1} = \frac{1}{1+1} = \frac{1}{2}$
 $\xrightarrow{1^-}$ $\frac{x - [1^-]}{x^2 - 1} = \frac{x}{(x-1)(x+1)} = \frac{1}{(1^-)^2 - 1} = \frac{1}{0^-} = -\infty$ } صحیح است \downarrow 5