

الف) $\lim_{n \rightarrow r^+} \varepsilon n - r = \lim_{n \rightarrow r^+} f(x) - r = \Delta$

ب) $\lim_{n \rightarrow r^-} \varepsilon n - r = \lim_{n \rightarrow r^-} f(x) - r = \Delta$

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الف) $\lim_{n \rightarrow r^+} f[n] - r = \lim_{n \rightarrow r^+} f[r^+] - r = \Delta$

ب) $\lim_{n \rightarrow r^-} f[n] - r = \lim_{n \rightarrow r^-} f[r^-] - r = f - r = \Delta$

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الف) $\lim_{n \rightarrow r^+} [\varepsilon n - r] = [f(r^+) - r] = [\Delta^+] = \Delta$

ب) $\lim_{n \rightarrow r^-} [\varepsilon n - r] = [f(r^-) - r] = [\Delta^-] = \Delta$

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الف) $[\lim_{n \rightarrow r^+} \varepsilon n - r] \Rightarrow \lim_{n \rightarrow r^+} \varepsilon n - r = r - r = \Delta \xrightarrow{[]} [\Delta] = \Delta$ جواب ندرستی

ب) $[\lim_{n \rightarrow r^-} \varepsilon n - r] \Rightarrow \lim_{n \rightarrow r^-} \varepsilon n - r = r - r = \Delta \xrightarrow{[]} [\Delta] = \Delta$ جواب ندرستی

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الف) $\lim_{n \rightarrow r} \frac{\varepsilon n - r}{n - r} = \frac{0}{0}$

ب) $\lim_{n \rightarrow r} \frac{\varepsilon n - r}{(n - r)^2} = \frac{0}{0}$

$\lim_{n \rightarrow r^+} \frac{\varepsilon n - r}{n - r} = \frac{r - r}{r^+ - r} = \frac{0}{0^+} = +\infty$

$\lim_{n \rightarrow r^+} f(n) = \frac{r - r}{(0^+)^2} = \frac{0}{0^+} = +\infty$

$\lim_{n \rightarrow r^-} \frac{\varepsilon n - r}{n - r} = \frac{r - r}{r^- - r} = \frac{0}{0^-} = -\infty$

$\lim_{n \rightarrow r^-} f(n) = \frac{r - r}{(0^-)^2} = \frac{0}{0^-} = +\infty$

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* برای حد داشتن تابع باید حد چپ و راست با هم برابرند و مساوی شش باشد (نه $\pm\infty$)

الف) $\lim_{n \rightarrow 3} \frac{4n-3}{n^2-\sqrt{n}+12} = \frac{11}{10}$ ب) $\lim_{n \rightarrow 3} \frac{4n-3}{[n-3]}$

$n^2 - \sqrt{n} + 12 = (n-3)(n-4)$

$\lim_{n \rightarrow 3^+} f(n) = \frac{9}{0^+} = +\infty$

$\lim_{n \rightarrow 3^-} f(n) = \frac{9}{0^-} = -\infty$

ب) $\lim_{n \rightarrow 3^+} \frac{9}{[3^+-3]} = \frac{9}{[0^+]} = \frac{9}{0^+} = +\infty$

$\lim_{n \rightarrow 3^-} \frac{9}{[3^--3]} = \frac{9}{[0^-]} = \frac{9}{-1} = -9$

الف) $\lim_{n \rightarrow 3} \frac{4n-3}{\sqrt{n-3}}$

$\lim_{n \rightarrow 3^+} f(n) = \frac{9}{\sqrt{0^+}} = +\infty$

$\lim_{n \rightarrow 3^-} f(n) = \frac{9}{\sqrt{0^-}} = -\infty$

ب) $\lim_{n \rightarrow 3} \frac{4n-3}{\sqrt{n^2-5n+12}} = \frac{11}{10}$

$n^2 - 5n + 12 = (n-3)(n-4)$

$\lim_{n \rightarrow 3^+} f(n) = \frac{9}{\sqrt{0^+}} = +\infty$

$\lim_{n \rightarrow 3^-} f(n) = \frac{9}{\sqrt{0^-}} = -\infty$

الف) $\lim_{n \rightarrow 3} [3n] + \lim_{n \rightarrow 3} [-2n] = 9 - 6 = 3$

ب) $\lim_{n \rightarrow -4} [-5n] + \lim_{n \rightarrow -4} [5n] = 20 - 20 = 0$

$\lim_{n \rightarrow 3^+} [3n] = 9$

$\lim_{n \rightarrow 3^-} [3n] = 8$

$\lim_{n \rightarrow 3^+} [-2n] = -6$

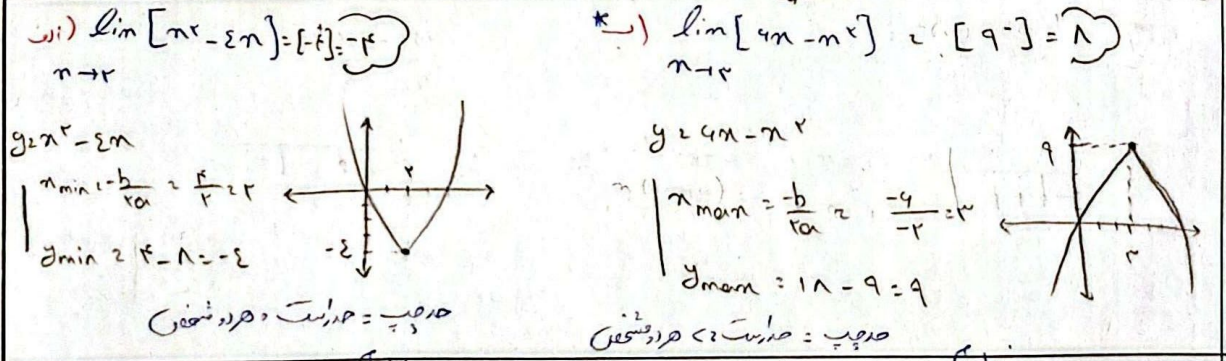
$\lim_{n \rightarrow 3^-} [-2n] = -5$

$\lim_{n \rightarrow -4^+} [-5n] = 20$

$\lim_{n \rightarrow -4^-} [-5n] = 20$

$\lim_{n \rightarrow -4^+} [5n] = -20$

$\lim_{n \rightarrow -4^-} [5n] = -19$



الف) $\lim_{n \rightarrow 2} \frac{|n-1|}{n^2-5n+12} = \frac{1}{10}$

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

$\lim_{n \rightarrow 2^+} f(n) = \frac{1}{(2-1)(2-4)} = \frac{1}{1 \cdot (-2)} = -\frac{1}{2}$

$\lim_{n \rightarrow 2^-} f(n) = \frac{1}{(2-1)(2-4)} = -\frac{1}{2}$

$\lim_{n \rightarrow 1^+} f(n) = \frac{1 - [1^+]}{(n-1)(n+1)} = \frac{1 - 1}{(n-1)(n+1)} = 0$

$\lim_{n \rightarrow 1^-} f(n) = \frac{1 - [1^-]}{(n-1)(n+1)} = \frac{1 - 0}{(n-1)(n+1)} = \frac{1}{0^-} = -\infty$

$\frac{n-1}{n^2-1} = \frac{1}{n+1}$