

بیان خدا

تلفظ

کیوان مکار شیب

الف) $\lim_{n \rightarrow 2^+} \frac{n+2}{n+1} = \lim_{n \rightarrow 2^+} \frac{2(2)+2}{(2)+1} = \frac{6}{3} = 2$ ✓ (1)

ب) $\lim_{n \rightarrow 2^-} \frac{n+2}{n+1} = \lim_{n \rightarrow 2^-} \frac{2(2)+2}{(2)+1} = \frac{6}{3} = 2$ ✓

ج) $\lim_{n \rightarrow 2} \frac{n+2}{n+1} = \lim_{n \rightarrow 2} \frac{2(2)+2}{(2)+1} = \frac{6}{3} = 2$ ✓

د) $\lim_{n \rightarrow 2} \frac{n+2}{n+1}$ $\xrightarrow{n \rightarrow 2^+}$ $n > 2 \rightarrow 2^2 > 2 \rightarrow [2^2] = 4$ $\xrightarrow{n \rightarrow 2^-}$ $n < 2 \rightarrow 2^2 < 2 \rightarrow [2^2] = 4$ $\rightarrow$ حاصله مشخص می شود و هیچ عبارات تعریف نشده و در نتیجه حد ندارد.

الف) $\lim_{n \rightarrow 2^-} f[n] - 2$ $\xrightarrow{n < 2}$ $[n] = 2 \rightarrow \lim_{n \rightarrow 2^-} f(2) - 2 = 1 - 2 = -1$ ✓ (2)

ب) $\lim_{n \rightarrow 2^-} [2n - 2] \rightarrow 2 < 2 \rightarrow 2n < 2 \rightarrow 2n - 2 < 10 \rightarrow [2n - 2] = 9 \rightarrow \lim_{n \rightarrow 2^-} [2n - 2] = 9$ ✓

ج) $\left[\lim_{n \rightarrow 2^-} 2n - 2 \right] = \left[\lim_{n \rightarrow 2^-} 2(2) - 2 \right] = [10] = 10$ ✓ (3)

د) $\left[\lim_{n \rightarrow 2^+} 2n - 2 \right] = \left[\lim_{n \rightarrow 2^+} 2(2) - 2 \right] = [10] = 10$ ✓

الف) $\lim_{n \rightarrow 2^-} \frac{2[n]+1}{2}$ $\xrightarrow{n < 2}$ $\lim_{n \rightarrow 2^-} \frac{2(2)+1}{2} = \left(\frac{5}{2} \right)$ ✓ (4)

ب) $\lim_{n \rightarrow 2^-} \left[\frac{2n+1}{2} \right] \rightarrow 2 < 2 \rightarrow 2n < 2 \rightarrow 2n+1 < 10 \rightarrow \left[\frac{2n+1}{2} \right] = 4$ $\rightarrow \lim_{n \rightarrow 2^-} \left[\frac{2n+1}{2} \right] = 4$ ✓

ج) $\left[\lim_{n \rightarrow 2^-} \frac{2n+1}{2} \right] \Rightarrow \left[\lim_{n \rightarrow 2^-} \frac{2(2)+1}{2} \right] = \left[\lim_{n \rightarrow 2^-} 5 \right] = 5$ ✓

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

الف) $\lim_{n \rightarrow 1} \frac{n-1}{(n-1)(n-1)} = \lim_{n \rightarrow 1} \frac{1}{n-1}$ $\xrightarrow{n \rightarrow 1^+} \lim_{n \rightarrow 1^+} \frac{1}{n-1} = +\infty$ $\xrightarrow{n \rightarrow 1^-} \lim_{n \rightarrow 1^-} \frac{1}{n-1} = -\infty$ $\rightarrow$ حد ندارد ع

ب) $\lim_{n \rightarrow 1} \frac{n-1}{(n-1)^2} = \lim_{n \rightarrow 1} \frac{1}{n-1}$ $\xrightarrow{n \rightarrow 1^+} \lim_{n \rightarrow 1^+} \frac{1}{n-1} = +\infty$ $\xrightarrow{n \rightarrow 1^-} \lim_{n \rightarrow 1^-} \frac{1}{n-1} = -\infty$ $\rightarrow$ حد ندارد د

الف) $\lim_{n \rightarrow -3} [-3n] = [\omega n]$ $\textcircled{1} n \rightarrow -3^+ \rightarrow n > -3 \rightarrow 3n < -9 \rightarrow -3n < 9 \rightarrow [-3n] = 9$ د

$n \rightarrow -3^- \rightarrow n < -3 \rightarrow 3n > -9 \rightarrow -3n < 9 \rightarrow [-3n] = 9$ د

$\rightarrow \lim_{n \rightarrow -3} [-3n] = 9$ د

$\textcircled{2} n \rightarrow -3^- \rightarrow n < -3 \rightarrow 3n > -9 \rightarrow -3n < 9 \rightarrow [-3n] = 9$

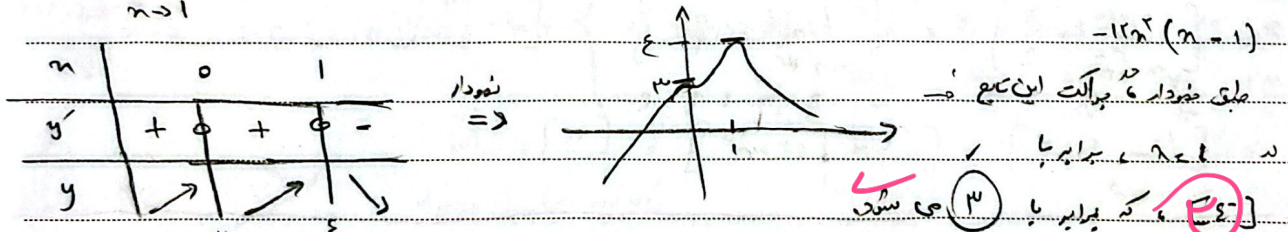
$n < -3 \rightarrow 3n < -9 \rightarrow [3n] = -10 \rightarrow 9 - (-10) = 19$ د

$\textcircled{1}, \textcircled{2} n \rightarrow -3$ $\rightarrow$ حد دارد $\rightarrow$ جواب: $\lim_{n \rightarrow -3} [-3n] = 9$

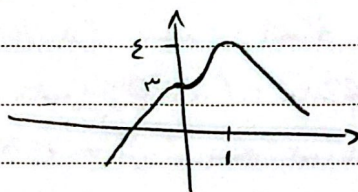
ب) $\lim_{n \rightarrow (-\frac{1}{2})^-} \left[\frac{-1}{n^2} \right]$ $\rightarrow n < -\frac{1}{2} \rightarrow -\frac{1}{n^2} < -4$ $\rightarrow \left[\frac{-1}{n^2} \right] = -5$

$\rightarrow \left[\frac{-1}{n^2} \right] = -5 \rightarrow \lim_{n \rightarrow (-\frac{1}{2})^-} \left[\frac{-1}{n^2} \right] = -5$ د

الف) $\lim_{n \rightarrow 1} [5n^3 - 3n^2 + 3]$ $\rightarrow y = 5n^3 - 3n^2 + 3 \rightarrow y' = 15n^2 - 6n = 3n(5n - 2)$ د



ب) $\lim_{n \rightarrow 0} [5n^3 - 3n^2 + 3]$ $\rightarrow$ $\lim_{n \rightarrow 0} [5n^3 - 3n^2 + 3] = 3$



$\textcircled{1} n \rightarrow 0^+ \rightarrow f(n) = 3^+$ $\textcircled{2} n \rightarrow 0^- \rightarrow f(n) = 3^-$

$\rightarrow \lim_{n \rightarrow 0^+} [f(n)] = 3$ $\rightarrow \lim_{n \rightarrow 0^-} [f(n)] = 3$ $\rightarrow \lim_{n \rightarrow 0} [f(n)] = 3$ د

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

$\xrightarrow{n \rightarrow 2^+} \lim_{n \rightarrow 2^+} \frac{n+2}{n+2} = 1$ $\xrightarrow{n \rightarrow 2^-} \lim_{n \rightarrow 2^-} \frac{n+2}{n+2} = 1$ $\rightarrow$ حد دارد د

ب) $\lim_{n \rightarrow 0} \frac{|\sin n|}{\sin n} = \lim_{n \rightarrow 0} \frac{-\sin n}{\sin n} = \lim_{n \rightarrow 0} -1 = -1$ د

$\xrightarrow{n \rightarrow 0^+} \lim_{n \rightarrow 0^+} \frac{|\sin n|}{\sin n} = -1$ $\xrightarrow{n \rightarrow 0^-} \lim_{n \rightarrow 0^-} \frac{|\sin n|}{\sin n} = 1$ $\rightarrow$ حد ندارد د

$$\lim_{x \rightarrow \frac{\pi}{2}^-} \sqrt{0} = 0$$

$$C_{2n-1} \xrightarrow{19} C_{2n}$$

ب) $\lim_{n \rightarrow \infty} \sqrt{n-4\sqrt{n}}$ $DF = [0, +\infty)$ تابع فقط در حد راست در $n=0$ دارد. $\lim_{n \rightarrow 0^+} \sqrt{n-2\sqrt{n}} = 0$

$\lim_{x \rightarrow 0^+} \frac{1}{x} = -\infty \checkmark$ (در بازه $x < 0$ حد ندارد)

$$1) \lim_{x \rightarrow r} \frac{x^r - [x]^r}{x - [x]} \quad x \rightarrow r \rightarrow x^r \rightarrow [x]^r \quad ? \quad [x] = r$$

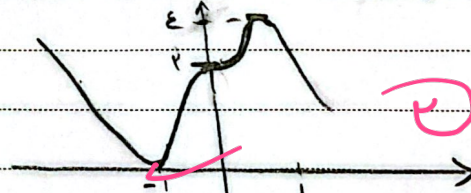
$$\textcircled{1} \rightarrow \lim_{x \rightarrow r^+} \frac{x^r - r}{x - r} = \lim_{x \rightarrow r^+} \frac{\cancel{(x-r)}(n+r)}{\cancel{x-r}} = \lim_{x \rightarrow r^+} (n+r) = \underline{\underline{2}} \checkmark$$

②: $\underbrace{x \rightarrow r^-}_{x < r} \rightarrow \dots \rightarrow \dots \rightarrow [x] = 4, [x] =$

$$\lim_{n \rightarrow r^-} \frac{x^n - r^n}{n-1} = \frac{(r^n)' - r^n}{r-1} = 1 \quad \checkmark$$

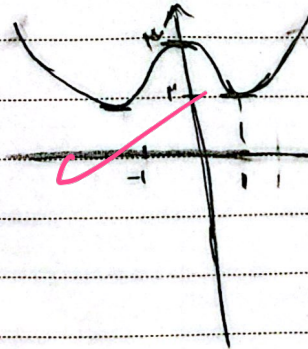
الف 1. $y = -3x^2 + 5x + 2 \rightarrow y = -15x^2 + 15x = -15x^2(x-1)$ (10)

x	-1	0	1
y'	-	+	+
y			



1) $y = x^x - 5x^2 + x \rightarrow y' = x^x - 5x - 2 = x^x(x^x - 1)$

z	-1	0	1
y'	$-$	$+$	$-$
y	$-$	$+$	$-$



سوال ۵ - ب

$$\text{ب) } u < -\frac{1}{4} \rightarrow u^4 > \frac{1}{16} \rightarrow -u^4 < -\frac{1}{16} \rightarrow -\frac{1}{u^4} > -16$$

$$\lim_{u \rightarrow -\frac{1}{4}} \left[-\frac{1}{u^4} \right] = -16$$

سوال ۸ - ب

$$u - 2\sqrt{u} \geq 0 \rightarrow \sqrt{u}(\sqrt{u} - 2) \geq 0 \quad \text{چون } u \leq 0$$

$$\rightarrow u \geq 4 \quad \text{II}$$

$$\downarrow$$

$$u \geq 0 \quad \text{I}$$

$$\text{I} \wedge \text{II} \quad u = 0 \leq u \leq 4 \rightarrow \text{تبراطاف شرط تعیین نمیشود} \quad \lim_{u \rightarrow 0} \sqrt{u - 2\sqrt{u}} = \text{X}$$