

الف) $\lim_{x \rightarrow 2^+} \frac{2x+8}{x+1} = \frac{9}{3} = 3$

ج) $\lim_{x \rightarrow 2} \frac{2x+8}{x+1} = \frac{9}{3} = 3$

ب) $\lim_{x \rightarrow 2^-} \frac{2x+8}{x+1} = \frac{9}{3} = 3$

د) $\lim_{x \rightarrow 0} \frac{2x+7}{[x^2]} = +\infty$
 $x \rightarrow 0^+ = \frac{7}{0^+} = +\infty$
 $x \rightarrow 0^- = \frac{7}{0^-} = +\infty$

ان) $\lim_{n \rightarrow 3^-} \{n\} - 2 = \underbrace{\{3^-\}}_1 - 2 = -1$

ج) $\left[\lim_{n \rightarrow 3^-} \{n\} - 2 \right] = [-1] = -1$

ب) $\lim_{n \rightarrow 3^-} [2n-2] = [10^-] = 9$

د) $\left[\lim_{n \rightarrow 3^+} \{n\} - 2 \right] = [10] = 10$

ان) $\lim_{n \rightarrow 2^-} \frac{3[n]+1}{2} = \frac{3[2^-]+1}{2} = \frac{7}{2}$

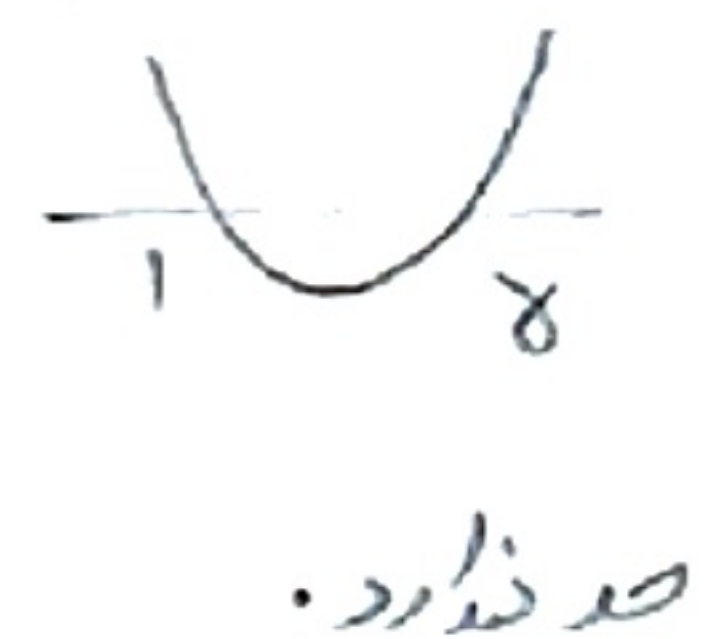
ج) $\left[\lim_{n \rightarrow 2^-} \frac{3n+1}{2} \right] = [8] = 8$

ب) $\lim_{n \rightarrow 2^-} \left[\frac{3n+1}{2} \right] = [8^-] = 7$

د) $\left[\lim_{n \rightarrow 2^+} \frac{3n+1}{2} \right] = [8] = 8$

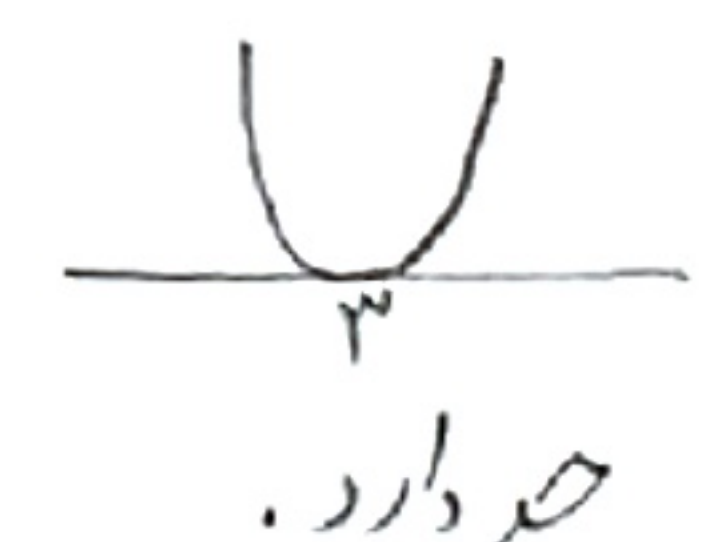
ان) $\lim_{n \rightarrow 1} \frac{n-8}{n^2-4n+8}$

$n \rightarrow 1^+ = \frac{-7}{-3} = +\infty$
 $n \rightarrow 1^- = \frac{-9}{-5} = -\infty$



ب) $\lim_{n \rightarrow 2} \frac{n-6}{n^2-4n+9}$

$n \rightarrow 2^+ = \frac{-4}{5} = -\infty$
 $n \rightarrow 2^- = \frac{-1}{5} = -\infty$



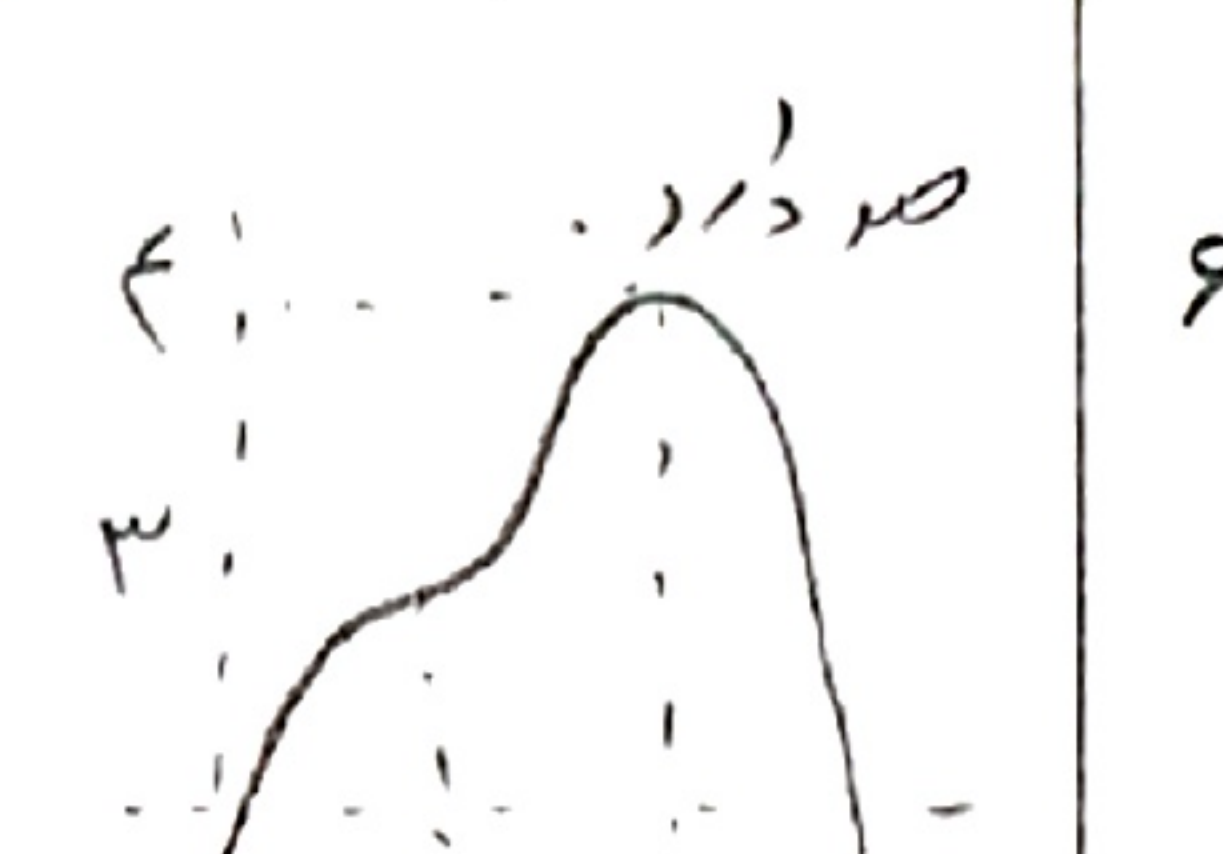
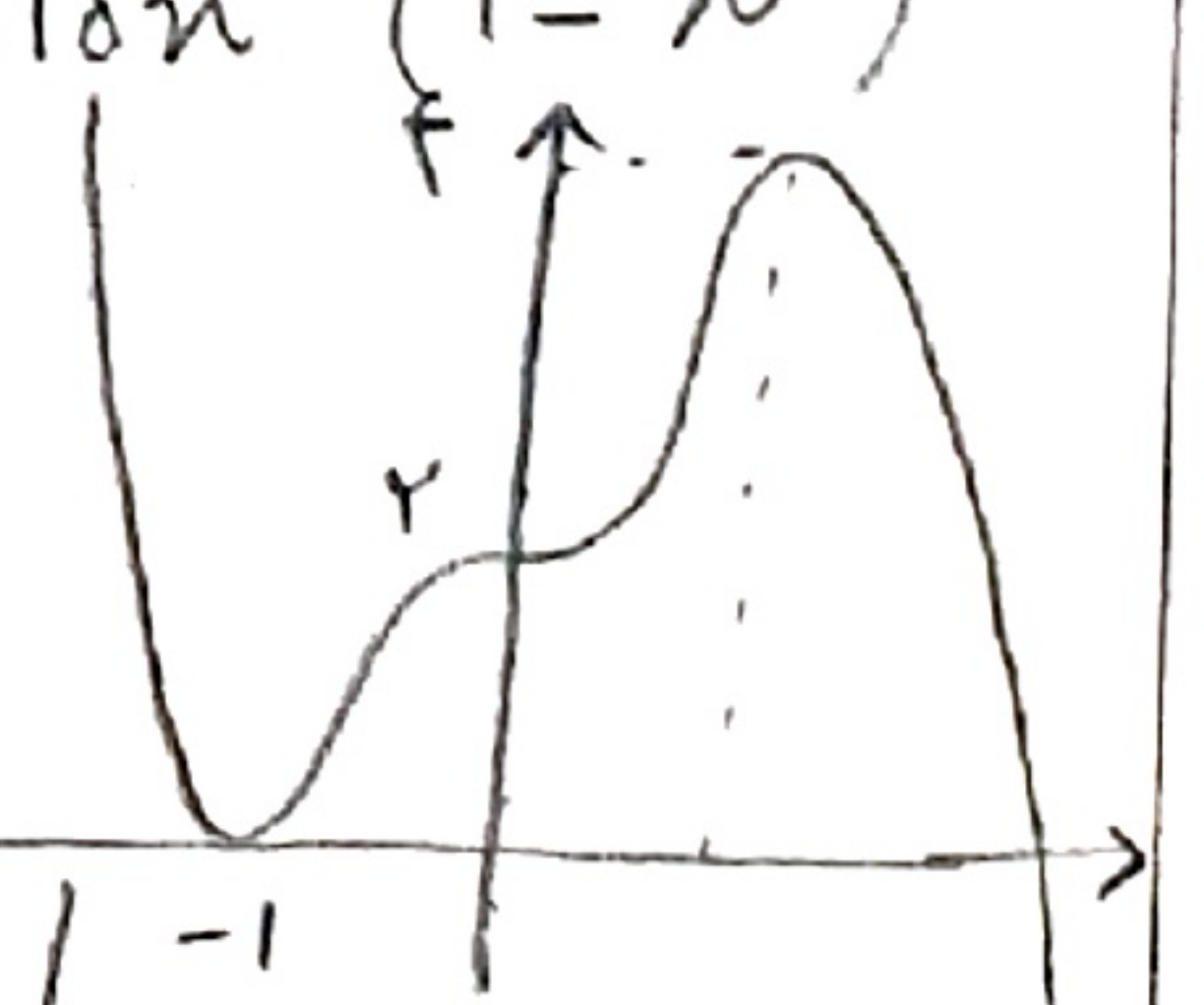
ان) $\lim_{n \rightarrow -3} [-3n] - [8n]$

$n \rightarrow -3^+ [9^-] - [-18^+] = 1 + 18 = 19$
 $n \rightarrow -3^- [9^+] - [-18^-] = 9 + 16 = 25$

ب) $\lim_{n \rightarrow (-\frac{1}{3})^-} \left[\frac{1}{n^2} \right]$

$x < -\frac{1}{3} \rightarrow \left[\frac{1}{x^2} \right] = [-16^+] = -16$
 $x > -\frac{1}{3} \rightarrow \left[\frac{1}{x^2} \right] = [-16^-] = -16$

صاف دارد.

ا) $\lim_{x \rightarrow 1} [3x^3 - 3x^2 + 3]$ $f(x) = 3x^3 - 3x^2 + 3 \rightarrow f'(x) = 9x^2 - 6x < 0$	$x \rightarrow 1^+ = [3] = 3$ $x \rightarrow 1^- = [3] = 3$ $x \rightarrow 0^+ [x^+] = 0$ $x \rightarrow 0^- [x^-] = 0$ ا) $\lim_{x \rightarrow 0} [3x^3 - 3x^2 + 3]$ $f(x) = 3x^3 - 3x^2 + 3 \rightarrow f'(x) = 9x^2 - 6x < 0$ 	6
ا) $\lim_{x \rightarrow 2} \frac{ x^3 - 1 }{x^2 - 2}$ ب) $\lim_{x \rightarrow \pi} \frac{ \sin x }{\sin x}$	$x \rightarrow 2^+ \frac{ 0^+ }{0^+} = \frac{2^3 - 1}{2^2 - 2} \xrightarrow{HOP} \frac{3 \cdot 2^2}{2} = 6$ $x \rightarrow 2^- \frac{ 0^- }{0^-} = \frac{-(2^3 - 1)}{2^2 - 2} \xrightarrow{HOP} \frac{-3 \cdot 2^2}{2} = -6$ $x \rightarrow \pi^+ \frac{ 0^+ }{0^+} = \frac{-\sin \pi}{\sin \pi} = \frac{-0}{0} = \frac{1}{2}$ $x \rightarrow \pi^- \frac{ 0^- }{0^-} = \frac{\sin \pi}{\sin \pi} = \frac{0}{0} = -\frac{1}{2}$	7
ا) $\lim_{x \rightarrow \frac{3\pi}{2}} \sqrt{\cos x}$ ب) $\lim_{x \rightarrow 0} \sqrt{x - 2\sqrt{x}}$	$x \rightarrow \frac{3\pi}{2}^+ = \sqrt{0^+} = 0$ $x \rightarrow \frac{3\pi}{2}^- = \sqrt{0^-} = 0$ $x \rightarrow 0^+ \sqrt{0^+} = 0$ $x \rightarrow 0^- \sqrt{0^-} = 0$ $x \rightarrow 0^+ \rightarrow 0 < x < 1 \rightarrow x < \sqrt{x} \rightarrow x - 2\sqrt{x} < 0$ 	8
ا) $\lim_{x \rightarrow 0^+} \frac{f(x) [\sin x]}{x^3 - x^2}$ ب) $\lim_{x \rightarrow 0^+} \frac{x^2 - [x^2]}{x - [x]}$	$\frac{(-1) [0^+]}{x^3 - x^2} = \frac{1}{x^3 - x^2} = \frac{1}{0^-} = -\infty$ $\frac{x^2 - [x^2]}{x - [x]} = \frac{x^2 - x^2}{x - x} = \frac{0}{0} \xrightarrow{HOP} \frac{2x}{1} = 2$ $\frac{x^2 - [x^2]}{x - [x]} = \frac{x^2 - x^2}{x - x} = \frac{0}{0} = 1$	9
ا) $y = 3x^3 - 3x^2 + 3$ $f'(x) = 9x^2 - 6x = 3x(3x - 2)$ ب) $y = x^3 - 3x^2 + 3$ $f'(x) = 3x^2 - 6x = 3x(x - 2)$	$\frac{-1 \ 0 \ +1}{-1 \ +1 \ +1 \ -}$ $\frac{-1 \ 0 \ +1}{-1 \ +1 \ -1 \ +}$  	10