Persian Note Book
Subject:
Date:

بسم الله الرحمن الرحیم

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سوال ①

$$\lim_{x\to 2^+} \frac{2x+5}{x+1} = \frac{9}{3} = 3$$

$$\lim_{x\to 2^-} \frac{2x+5}{x+1} = \frac{9}{3} = 3$$

$$\lim_{x\to 2} \frac{2x+5}{x+1} = \frac{9}{3} = 3$$

$$\lim_{x\to 0} \frac{2x+7}{[x^2]} \quad \xrightarrow{x\to 0^+} \frac{7}{[0^+]} = \frac{7}{0} \quad +\infty$$

$$\xrightarrow{x\to 0^-} \frac{7}{[0^+]} = \frac{7}{0} \quad +\infty$$

سوال ②

$$\lim_{x\to 3^-} 4[x]-2 = \lim_{x\to 3^-} 4\times 2-2 = 6$$

$$\lim_{x\to 3^-} [4x-2] = [4\times 3^- -2] = [10^-] = 9$$

$$\left[\lim_{x\to 3^-} 4x-2\right] = 10$$

$$\left[\lim_{x\to 3^+} 4x-2\right] = 10$$

سوال ③

$$\lim_{x\to 3^-} \frac{3[x]+1}{2} = \lim_{x\to 3^-} \frac{3\times 2+1}{2} = \frac{7}{2}$$

$$\lim \left[\frac{3x+1}{2}\right] = \lim [5^-] = 4$$

$$\left[\lim_{x\to 3^-}\frac{3x+1}{2}\right]=5 \qquad \left[\lim_{x\to 3^+}\frac{3x+1}{2}\right]=5$$

سوال ④

$$\lim_{x\to 1}\frac{x-5}{(x-1)(x-5)} \longrightarrow \frac{-4}{0}\begin{cases}1^+ \to \dfrac{-4}{0^-}=+\infty\\[2mm] 1^- \to \dfrac{-4}{0^+}=-\infty\end{cases}$$

$$\lim_{x\to 3}\frac{x-4}{\underset{(x-3)^2}{x^2-6x+9}}=\frac{-1}{0}\begin{cases}3^+ \to \dfrac{-1}{0^+}=-\infty\\[2mm] 3^- \to \dfrac{-1}{0^+}=-\infty\end{cases}$$

سوال ⑤

$$\lim_{x\to -3}[-3x]-[5x] \begin{cases}-3^+ \to 8-(-15)=23\\ -3^- \to 9-(-16)=25\end{cases}$$

$\cancel{9}$ $\cancel{-15}$

$$\lim_{x\to(-\frac{1}{2})^-}\left[\frac{-1}{x^4}\right] \to x<-\frac{1}{2} \to x^4>\frac{1}{16} \to \frac{1}{x^4}<16$$

$$-\frac{1}{x^4}>-16 \to \left[-\frac{1}{x^4}\right]=-16$$

سوال ⑥

$$\lim_{x\to 1}[4x^3-3x^4+3] \qquad -12x^3+12x^2=0 \qquad 12x^2(1-x)=0$$

$x \begin{cases}0\\1\end{cases}$

0		1	
+	+	−	
↗	↗	↘	

$$\longrightarrow \lim_{x\to 1^+}f(x)=3$$

$$\lim_{x\to 1^-}f(x)=3$$

$$\lim_{x\to 0}\left[4x^3-3x^4+2\right] = -12x^3+12x^2 = 12x^2(1-x)=0$$

$x=0$, $x=1$: $\frac{\overset{0}{|}\quad\quad 1}{+\ |\ +\ |\ -}$; $\nearrow 3 \nearrow \searrow$

$= \lim_{x\to 0^+} = 3$

$\lim_{x\to 0^-} = 2$

سوال ۷

$$\lim_{x\to 2}\frac{|x^3-8|}{x^2-4}$$

$\xrightarrow{x\to 2^+} \frac{\cancel{(x-2)}(x^2+2x+4)}{\cancel{(x-2)}(x+2)} = \frac{12}{4} = 3$

$\xrightarrow{x\to 2^-} \frac{-\cancel{(x-2)}(x^2+2x+4)}{\cancel{(x-2)}(x+2)} = \frac{-12}{4} = -3$

$$\lim_{x\to \pi}\frac{|\sin x|}{\sin x}$$

$\xrightarrow{x\to \pi^+} \frac{-\sin x}{\sin x} = -1$

$\xrightarrow{x\to \pi^-} \frac{\sin x}{\sin x} = 1$

سوال ۹

$$\lim_{x\to \frac{3\pi}{2}}\sqrt{-1-\sin x}$$

$\xrightarrow{x\to \frac{3\pi}{2}^+} \sqrt{0^+} = 0$

$\xrightarrow{x=\frac{3\pi}{2}^-} = \sqrt{0^-}$ = ت ن د

$$\lim_{x\to 0}\sqrt{x-2\sqrt{x}}$$

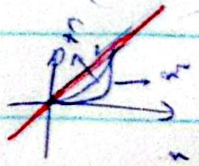
$\xrightarrow{x\to 0^-}$ ت ن د

$\xrightarrow{x\to 0^+} \sqrt{0^+-2\sqrt{0^+}} = \overset{0^-}{\text{ف}}$ ـد

$(x=0.04)$

سوال ۹

$$\lim_{x\to 0^+}\frac{(-1)^{[\sin x]}}{x^4-x^2} = \frac{(-1)^0}{(x^4-x^2)} = \frac{1}{0^-} = -\infty$$



$$\lim_{x\to 2}\frac{x^2-[x^2]}{x-[x]}$$

$\xrightarrow{x\to 2^+} \lim\left(\frac{x^2-4}{x-2} = x+2\right) = 4$

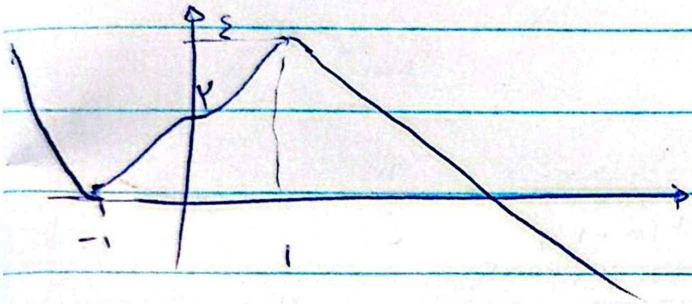
$\xrightarrow{x\to 2^-} \lim\left(\frac{x^2-3}{x-1}\right) = \frac{1}{1} = 1$

سوال ۱

$y = 5x^3 - 3x^5 + 2$

$y' = -15x^4 + 15x^2 \to 15x^2(1-x^2)$

x		-1		0		1	
y'	$-$		$+$		$+$		$-$



$y = x^4 - 2x^2 + 3$

$y' = 4x^3 - 4x \qquad 4x(x^2-1)$

x		-1		0		1	
y'	$-$		$+$		$-$		$+$
y	$\searrow$	۲	$\nearrow$	۳	$\searrow$	۲	$\nearrow$