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به نام خداوند بخشنده مهربان

سوال ۱

۱۹٫۵ آفرین به شما

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

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

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

$$\lim_{x \to 0} \frac{2x+7}{[x^2]} \begin{cases} x \to 0^+ & \frac{7}{[0^+]} \quad \frac{7}{0} \quad \text{دن} \\ x \to 0^- & \frac{7}{[0^+]} = \frac{7}{0} \quad \text{دن} \end{cases}$$

سوال ۲

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

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

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

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

سوال ۳

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

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

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

سوال ۴

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

ب

$$\lim_{x\to 3} \frac{x-4}{x^2-6x+9} = \frac{-1}{0^+} \quad \begin{cases} 3^+ \to \dfrac{-1}{0^+} = -\infty \\ 3^- \to \dfrac{-1}{0^+} = -\infty \end{cases}$$

$(x-3)^2$

سوال ۵

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

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

ب

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

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

سوال ۶

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

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

	0		1	
+		+		−
↗		↗	۴	↘

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

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

ب

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

$x=0 \qquad x=1$

$\lim\limits_{x\to 0^+} = 3$

$\lim\limits_{x\to 0^-} = 2$

سوال ۷.

$\lim\limits_{x\to 2}\dfrac{|x^3-8|}{x^2-4} \xrightarrow{x\to 2^+} \dfrac{(\cancel{x-2})(x^2+2x+4)}{(\cancel{x-2})(x+2)} = \dfrac{12}{4} = 3$

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

$\lim\limits_{x\to \pi}\dfrac{|\sin x|}{\sin 2x} \xrightarrow{x\to \pi^+} \dfrac{-\sin x}{2\cos x\cdot \sin x} = \dfrac{-1}{-2} \to \dfrac{1}{2}$

$\xrightarrow{x\to \pi^-} \dfrac{\sin x}{2\cos x\cdot \sin x} = \dfrac{1}{-2} \to -\dfrac{1}{2}$

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سوال ۸

$\lim\limits_{x\to \frac{3\pi}{2}}\sqrt{1-\sin x} \xrightarrow{x\to \frac{3\pi}{2}^+} \sqrt{0^+} = 0$

$\xrightarrow{x=\frac{3\pi}{2}^-} = \sqrt{0^-} =$ ندارد

$\lim\limits_{x\to 0}\sqrt{x-2\sqrt{x}} \xrightarrow{x\to 0^-}$ ندارد

$\xrightarrow[(x=0/04)]{x\to 0^+} \sqrt{0^+-2\sqrt{0^+}} = \sqrt{0^-}$ ندارد

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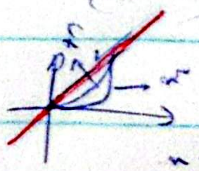
سوال ۹

$\lim\limits_{x\to 0^+}\dfrac{(-1)^{[\sin x]}}{x^3-x^2} = \dfrac{(-1)^0}{(x^3-x^2)} = \dfrac{1}{0^-} = -\infty$



$\lim\limits_{x\to 2}\dfrac{x^2-[x^2]}{x-[x]} \xrightarrow{x\to 2^+} \lim\left(\dfrac{x^2-4}{x-2}\right) = x+2 = 4$

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

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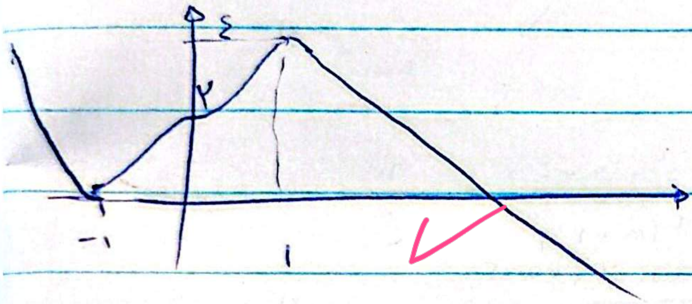
سؤال (۱)

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

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

x		-1		0		1	
y'	$-$		$+$		$+$		$-$
y	$\searrow$	0	$\nearrow$	2	$\nearrow$	4	$\searrow$



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

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

x		-1		0		1	
y'	$-$		$+$		$-$		$+$
y	$\searrow$	2	$\nearrow$	3	$\searrow$	2	$\nearrow$