

$$الف) \lim_{x \rightarrow r^+} \frac{rx+a}{x+1} = \frac{\cancel{r+a}^q}{r} = \boxed{r}$$

$$ب) \lim_{x \rightarrow r^-} \frac{rx+a}{x+1} = \frac{\cancel{r+a}^q}{r} = \boxed{r}$$

$$ج) \lim_{x \rightarrow r} \frac{rx+a}{x+1} \begin{cases} \lim_{x \rightarrow r^+} \frac{rx+a}{x+1} = r \\ \lim_{x \rightarrow r^-} \frac{rx+a}{x+1} = r \end{cases} \Rightarrow \boxed{r}$$

$$د) \lim_{x \rightarrow -} \frac{rx+v}{[x^r]} \begin{cases} \xrightarrow{x \rightarrow r^-} \lim_{x \rightarrow \cdot+} \frac{rx+v}{[x^r]} = \frac{v}{\cdot+} = +\infty \text{ منف منته} \\ \xrightarrow{x \rightarrow \cdot-} \lim_{x \rightarrow \cdot-} \frac{rx+v}{[x^r]} = \frac{v}{\cdot+} = +\infty \text{ منف منته} \end{cases} \Rightarrow \boxed{+\infty}$$

$$الف) \lim_{x \rightarrow r^-} F[\cancel{x}^r] - r = 9$$

$$ب) \lim_{x \rightarrow r^-} [\epsilon x - r] = \lim_{x \rightarrow r^-} [\epsilon x \cancel{e^{-r}}^r] = 9$$

$$ج) \left[\lim_{x \rightarrow r^-} [\epsilon x - r] \right] = \left[\lim_{x \rightarrow r^-} \epsilon x \cancel{e^{-r}}^r \right] = 10$$

$$د) \left[\lim_{x \rightarrow r^+} [\epsilon x - r] \right] = \left[\lim_{x \rightarrow r^+} \epsilon x \cancel{e^{-r}}^r \right] = 10$$

$$الف) \lim_{x \rightarrow r^-} \frac{r[x]+1}{r} = \lim_{x \rightarrow r^-} \frac{r[\cancel{x}^r]+1}{r} = \frac{v}{r}$$

$$ب) \lim_{x \rightarrow r^-} \left[\frac{rx+1}{r} \right] = \lim_{x \rightarrow r^-} \left[\frac{r(\cancel{r}^-)+1}{r} \right] = \lim_{x \rightarrow r^-} [a^-] = r$$

$$ج) \left[\lim_{x \rightarrow r^-} \frac{rx+1}{r} \right] = \left[\lim_{x \rightarrow r^-} \frac{\cancel{a+1}^{\omega^-}}{r} \right] = a$$

$$د) \left[\lim_{x \rightarrow r^+} \frac{rx+1}{r} \right] = \left[\lim_{x \rightarrow r^+} \frac{\cancel{a+1}^{\omega^+}}{r} \right] = a$$

$$\text{الف) } \lim_{x \rightarrow 1} \frac{x-5}{x^2-4x+5} = \frac{-4}{1-4+5} = \frac{-4}{2} = -2$$

سوال ۴

مستند

$$\lim_{x \rightarrow 1^+} \frac{x-5}{x^2-4x+5} = \frac{-4}{0^+} = -\infty$$

$$(x-1)(x-5) = 0 \quad \begin{matrix} x=1 \\ x=5 \end{matrix}$$

1	5
+	-
1 ⁻	1 ⁺

$$\text{ب) } \lim_{x \rightarrow 3} \frac{x-2}{x^2-4x+9} = \lim_{x \rightarrow 3^+} \frac{x-2}{(x-3)^2} = \frac{-1}{0^+} = -\infty$$

3	*
+	+

مستند

$$\text{ج) } \lim_{x \rightarrow -2} [-\frac{9}{x}] - [\frac{10}{x}] = \lim_{x \rightarrow -2^+} [-\frac{9}{x}] - [\frac{10}{x}] = 4.5 - 5 = -0.5$$

$$\text{د) } \lim_{x \rightarrow (-\frac{1}{2})^-} [-\frac{1}{x^2}] - [\frac{-1}{(-\frac{1}{2})^2}] = \lim_{x \rightarrow (-\frac{1}{2})^-} [-\frac{1}{x^2}] = [-4] = -4$$

$$\text{ه) } \lim_{x \rightarrow 1} [6x^2 - 3x^2 + 3] = \lim_{x \rightarrow 1} [3x^2 + 3] = [6] = 6$$

سوال ۴

$$y' = 12x^2 - 12x^2 = 0 \Rightarrow x^2(12-12x) = 0 \quad \begin{matrix} x=0 \\ x=1 \end{matrix}$$

0	1
+	-

$$\text{ب) } \lim_{x \rightarrow 0} [6x^2 - 3x^2 + 3] =$$

$$x \rightarrow 0$$

$$\lim_{x \rightarrow 0^-} [3] = 3$$

مستند

$$\lim_{x \rightarrow 0^+} [3] = 3$$

سؤال ٧) الف) $\lim_{x \rightarrow 2} \frac{|x^3 - 8|}{x^2 - 4}$

$x \rightarrow 2^+$ $\lim_{x \rightarrow 2^+} \frac{(x-2)(x^2+2x+4)}{(x-2)(x+2)} = \frac{4+8+8}{4} = 3$

$x \rightarrow 2^-$ $\lim_{x \rightarrow 2^-} \frac{-x^3+8}{x^2-4} = \frac{-(x-2)(x^2+2x+4)}{(x-2)(x+2)} = -3$

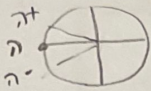
صدا ندارد

ب) $\lim_{x \rightarrow \pi} \frac{|\sin x|}{\sin 2x}$

$x \rightarrow \pi^+$ $\lim_{x \rightarrow \pi^+} \frac{\sin x}{2 \sin x \cos x} = \frac{1}{2x-1} = -\frac{1}{2}$

$x \rightarrow \pi^-$ $\lim_{x \rightarrow \pi^-} \frac{-\sin x}{2 \sin x \cos x} = \frac{-1}{2x-1} = \frac{1}{2}$

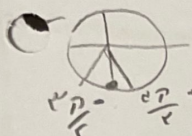
صدا ندارد.



سؤال ٨) الف) $\lim_{x \rightarrow \frac{3\pi}{2}} \sqrt{\cos x}$

$x \rightarrow \frac{3\pi}{2}^+$ $\lim_{x \rightarrow \frac{3\pi}{2}^+} \sqrt{\cos x} = 0$

$x \rightarrow \frac{3\pi}{2}^-$ $\lim_{x \rightarrow \frac{3\pi}{2}^-} \sqrt{\cos x} = x$ صدا ندارد



تعریف می‌دهد زیرادخال منفی $\Rightarrow$ صدا ندارد $\lim_{x \rightarrow 0^+} \sqrt{x-2\sqrt{x}}$

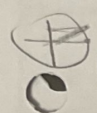
تعریف می‌دهد زیرادخال مثبت $\Rightarrow$ صدا ندارد $\lim_{x \rightarrow 0^-} \sqrt{x-2\sqrt{x}}$

سؤال ٩) الف) $\lim_{x \rightarrow 0^+} \frac{(-1)^{[\sin x]}}{x^2 - x^2}$

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

$[\sin x] = 0$

$x^2(x-1)$ $\begin{matrix} 0 & 1 \\ 0 & 1 \end{matrix}$ $\begin{matrix} + & - & + \\ - & - & + \end{matrix}$



ب) $\lim_{x \rightarrow 2} \frac{x^2 - [x^2]}{x - [x]}$

$x \rightarrow 2^+$ $\lim_{x \rightarrow 2^+} \frac{x^2 - 4}{x - 2} = \lim_{x \rightarrow 2^+} \frac{(x-2)(x+2)}{x-2} = 4$

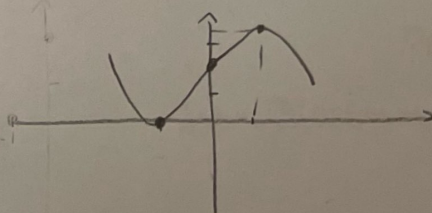
$x \rightarrow 2^-$ $\lim_{x \rightarrow 2^-} \frac{x^2 - 3}{x - 1} = \lim_{x \rightarrow 2^-} \frac{1}{1} = 1$

صدا ندارد

الف) $y = 5x^3 - 3x^2 + 1$

$y' = 15x^2 - 6x = 0$ $x = 0$

$15x^2(x+1/2) = 0$ $x = \pm 1/2$



x	-1	0*	1
y'	+	0	+
y	+	↗	↘

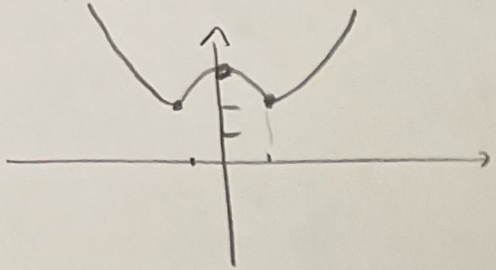
-0+1

سؤال ١٠)

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

$$y' = 4x^3 - 4x = 0$$

$$4x(x^2 - 1) = 0 \quad \begin{cases} x = 0 \\ x = \pm 1 \end{cases}$$



x	-1	0	1
y'	-	+	-
y	2	3	2

نتیجه (۱-)