

ا)  $\lim_{x \rightarrow 1} \frac{x^2 + \omega}{x+1} = \frac{9}{1} = 9$  ✓      ب)  $\lim_{x \rightarrow 1} \frac{x^2 + \omega}{x+1} = 9$

2)  $\lim_{x \rightarrow 2} \frac{y_{x+2}}{x+1} = 3$  2)  $\lim_{x \rightarrow 0} \frac{y_{x+1}}{[x^2]} \Rightarrow 0$  تقریباً 0  $\Rightarrow$  نزدیک 0

ا)  $\lim_{x \rightarrow a^+} f(x) - 2 = \lim_{x \rightarrow a^+} f(x) - 2 = 4$  ✓

$$\therefore \lim_{x \rightarrow 2^-} [(f(x))^2 - 2] = [10] = 9$$

c)  $\lim_{x \rightarrow 1^-} f(x) = 1$  ✓

$$)) [\lim_{x \rightarrow x^+} f(x) - \gamma] = 1. \quad \checkmark$$

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

$$\Leftarrow) \lim_{x \rightarrow r^-} \left[ \frac{1}{y} \right] = [a^-] = \infty \checkmark$$

$$c) \left[ \lim_{x \rightarrow 3^-} \frac{f(x)}{g(x)} \right] = \omega$$

c)  $\left[ \lim_{x \rightarrow +\infty} \frac{x+1}{y} \right] = \infty$  ✓

$$\lim_{x \rightarrow 1} \frac{(x-1)}{(x-1)(x-1)} = \frac{1}{x-1}$$

$$\lim_{x \rightarrow 1} \begin{cases} \xrightarrow{+} \frac{1}{x-1} = +\infty \\ \xrightarrow{-} \frac{1}{x-1} = -\infty \end{cases} \quad \checkmark$$

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

$$\lim_{x \rightarrow \frac{1}{4}} \left[ \frac{1}{x} \right] \Rightarrow x < \frac{1}{4}$$

$$\lim_{x \rightarrow 1} [4x^3 - 3x^2 + 3] \xrightarrow{\text{مستقيم دال}} [12x^2 - 12x^3] \Rightarrow \frac{0}{0}$$

$$\rightarrow x \begin{cases} \xrightarrow{+} [4] = 4 \\ \xrightarrow{-} [3] = 3 \end{cases} = 1$$

الف) ①

$$\rightarrow \lim_{x \rightarrow 0} [4x^3 - 3x^2 + 3] \begin{cases} \xrightarrow{+} = 4 \\ \xrightarrow{-} = 3 \end{cases}$$

جواب دالين صفر

$$\lim_{x \rightarrow 2} \frac{x^3 - 1}{x^2 - 1} = \frac{0}{0} \begin{cases} \xrightarrow{+} \frac{(x-1)(x^2+x+1)}{(x-1)(x+1)} = 3 \\ \xrightarrow{-} \frac{-(x-1)(x^2+x+1)}{(x-1)(x+1)} = -3 \end{cases}$$

الف) ②

$$\lim_{x \rightarrow \pi} \frac{|\sin x|}{\sin 2x} \begin{cases} \xrightarrow{+} \frac{\sin x}{\sin 2x \cos x} = \frac{1}{\pi} \\ \xrightarrow{-} \frac{\sin x}{-\sin 2x \cos x} = -\frac{1}{\pi} \end{cases}$$

ب) ③

$$\lim_{x \rightarrow \frac{\pi}{2}} \sqrt{\cos x} \begin{cases} \xrightarrow{+} \sqrt{0} = 0 \\ \xrightarrow{-} \sqrt{0} \rightarrow 0 \end{cases}$$

الف) ④

$$\lim_{x \rightarrow 0} \sqrt{x - 2\sqrt{x}} = \sqrt{x}(\sqrt{x} - 2) \Rightarrow \frac{0}{0}$$

$$\lim_{x \rightarrow 0} \sqrt{x}(\sqrt{x} - 2) \rightarrow \text{صفر كرامت زدن}$$

ب) ⑤

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

الف) ⑥

$$\left( \star \right) x \rightarrow + \Rightarrow [\sin x] = [0^+] = 0 \Rightarrow (-1)^0 = 1$$

⑦

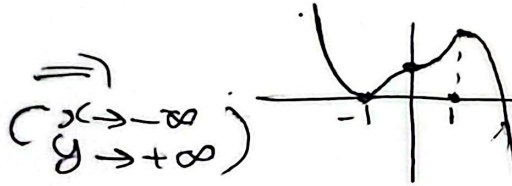
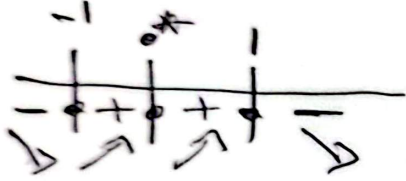
$$\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - [x]} \begin{cases} \xrightarrow{+} \frac{x^2 - 4}{x - 2} = 2 + 2 = 4 \\ \xrightarrow{-} \frac{x^2 - 4}{x - 1} = 1 \end{cases}$$

ب) ⑧

الف)  $y = 5x^3 - 3x^2 + 2$

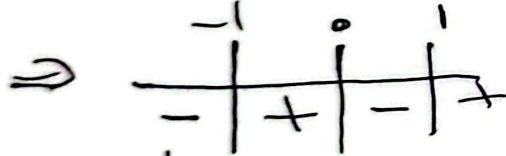
ب)  $y = x^4 - 2x^3 + 2$

$f(x) = 5x^3 - 3x^2 + 2 \Rightarrow f'(x) = 15x^2 - 6x = 3x^2(5 - 2x) \quad \text{الف) ۱۰}$

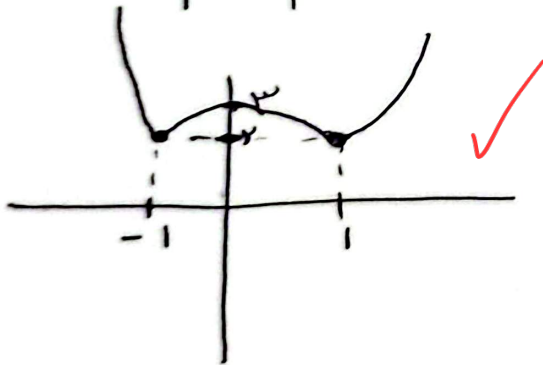


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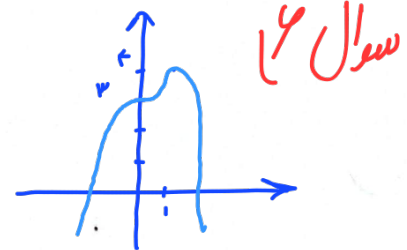
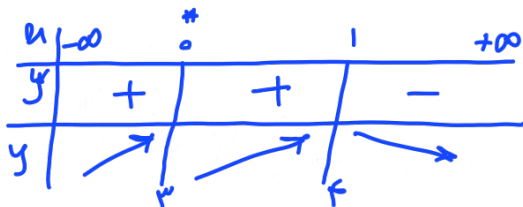
$f(x) = x^4 - 2x^3 + 2 \Rightarrow f'(x) = 4x^3 - 6x^2 = x^2(4x - 6) \quad \text{ب) ۱۰}$



$\Rightarrow \begin{cases} f(-1) = 3 \\ f(0) = 2 \\ f(1) = 1 \end{cases} \quad \begin{matrix} (x \rightarrow -\infty) \\ (y \rightarrow +\infty) \end{matrix}$



$y = 5x^3 - 3x^2 + 2 \rightarrow y' = 15x^2 - 6x \xrightarrow{y'=0} 3x^2(5-2x) = 0 \rightarrow \begin{cases} x=0 \\ x=2.5 \end{cases}$



۱)  $\lim_{x \rightarrow 0} [5x^3 - 3x^2 + 2] = \begin{cases} \lim_{x \rightarrow 0^+} [5x^3 - 3x^2 + 2] = 2 \\ \lim_{x \rightarrow 0^-} [5x^3 - 3x^2 + 2] = 2 \end{cases}$