

داریم دفتر (A)

سوال ۱)

الف)  $\lim_{x \rightarrow 2^+} \frac{2x+5}{x+1} = \frac{2(2)+5}{2+1} = \frac{9}{3} = 3$  ✓

ب)  $\lim_{x \rightarrow 2^-} \frac{2x+5}{x+1} = \frac{2(2)+5}{2+1} = 3$  ✓

ج)  $\lim_{x \rightarrow 2} \frac{2x+5}{x+1} = \frac{2(2)+5}{2+1} = 3$  ✓

د)  $\lim_{x \rightarrow 0} \frac{2x+7}{[x]} = \frac{7}{0}$  ق.ن ✓

(۲)

الف)  $\lim_{x \rightarrow 1^-} f(x) - 2 = f[1^-] - 2 = f(1) - 2 = 4$  ✓

سوال ۲)

ب)  $\lim_{x \rightarrow 1^-} [fx-2]$  :  $x < 1 \rightarrow fx < 1 \rightarrow fx-2 < -1 \rightarrow \lim [fx-2] = -1$  ✓

(۱.۵)

ج)  $\left[ \lim_{x \rightarrow 1^-} fx-2 \right]$  :  $1^- = 0.9 \rightarrow \left[ \lim_{x \rightarrow 1^-} f(0.9)-2 \right] = \left[ \frac{10}{9} - 2 \right] = \left[ -\frac{8}{9} \right] = -1$  ✓

د)  $\left[ \lim_{x \rightarrow 1^+} fx-2 \right]$  :  $1^+ = 1.1 \rightarrow f(1.1)-2 = 10/11 - 2 \rightarrow \left[ \lim_{x \rightarrow 1^+} 10/11 - 2 \right] = -1$  ✓

الف)  $\lim_{x \rightarrow 2^-} \frac{3[x]+1}{x} \xrightarrow{[x]=2} \lim_{x \rightarrow 2^-} \frac{3(2)+1}{x} = \frac{7}{2} = 3.5$  ✓

سوال ۳)

ب)  $\lim_{x \rightarrow 3^-} \left[ \frac{3x+1}{x} \right] \rightarrow x < 3 \rightarrow 3x < 9 \rightarrow 3x+1 < 10 \rightarrow \frac{3x+1}{x} < \frac{10}{3} \rightarrow [ ] = 3$  ✓

(۲)

ج)  $\left[ \lim_{x \rightarrow 3^-} \frac{3x+1}{x} \right] \rightarrow x < 3 \rightarrow 3x < 9 \rightarrow 3x+1 < 10 \rightarrow \frac{3x+1}{x} < \frac{10}{3} \rightarrow \lim_{x \rightarrow 3^-} \frac{3x+1}{x} = \frac{10}{3} \rightarrow [ ] = 3$  ✓

د)  $\left[ \lim_{x \rightarrow 3^+} \frac{3x+1}{x} \right]$  :  $x > 3 \rightarrow 3x > 9 \rightarrow 3x+1 > 10 \rightarrow \frac{3x+1}{x} > \frac{10}{3} \rightarrow \lim_{x \rightarrow 3^+} \frac{3x+1}{x} = \frac{10}{3} \rightarrow [ ] = 4$  ✓

الف)  $\lim_{x \rightarrow 1} \frac{x-5}{x^2-4x+5} \cdot \lim_{x \rightarrow 1} \frac{x-5}{(x-5)(x-1)}$   $\xrightarrow{x \rightarrow 1^+} \frac{1}{0^+} = +\infty$   $\xrightarrow{x \rightarrow 1^-} \frac{1}{0^-} = -\infty$  ✓

سوال (4)

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

(2)

الف)  $\lim_{x \rightarrow -1^0} [-12x] - [5x]$   $\xrightarrow{x > -1^0} (-1)^+ \xrightarrow{-1x < 9, 5x > -5} 1 - (-15) = 16$   $\xrightarrow{x < -1^0} (-1)^- \xrightarrow{-1x > 9, 5x < -5} 9 - (-14) = 23$  ✓

سوال (5)

(1)

ب)  $\lim_{x \rightarrow (-\frac{1}{4})^-} \left[ \frac{-1}{x^2} \right] = -14$   $x < -\frac{1}{4} \rightarrow x^2 > \frac{1}{16} \rightarrow -x^2 < -\frac{1}{16} \rightarrow -\frac{1}{x^2} > -14$

سوال (6)

الف)  $\lim_{x \rightarrow 2} \frac{|x^3-1|}{x^2-4}$   $\xrightarrow{x^+} \lim_{x \rightarrow 2} \frac{x^3-1}{x^2-4} = \frac{(x-1)(x^2+x+1)}{(x-2)(x+2)} = \frac{12}{4} = 3$   $\xrightarrow{x^-} \lim_{x \rightarrow 2} \frac{-(x^3-1)}{x^2-4} = \frac{-12}{4} = -3$  ✓

سوال (7)

ب)  $\lim_{x \rightarrow \pi} \frac{|\sin x|}{\sin x}$   $\xrightarrow{x^+} \frac{-\sin x}{\sin x \cos x} = \frac{-1}{-1} = 1$   $\xrightarrow{x^-} \frac{\sin x}{\sin x \cos x} = \frac{1}{-1} = -1$  ✓

(2)

الف)  $\lim_{x \rightarrow \frac{\pi}{2}} \sqrt{\cos x}$   $\xrightarrow{x^+} \sqrt{0^+} = 0$   $\xrightarrow{x^-} \sqrt{0^-} = 0$  ✓

سوال (8)

(1, 5)

ب)  $\lim_{x \rightarrow 0} \sqrt{x-2\sqrt{x}}$   $\xrightarrow{x^+} \sqrt{0-2(0)} = \sqrt{0} = 0$   $\xrightarrow{x^-}$  (ن)

$\lim_{x \rightarrow 0} \sqrt{x-2\sqrt{x}} =$  تعریف نشده

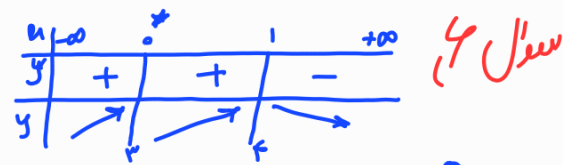
(I)  $x \geq 0$

$x-2\sqrt{x} \geq 0 \rightarrow \sqrt{x}(\sqrt{x}-2) \geq 0 \rightarrow \frac{0}{+1-2} \rightarrow x \geq 4 \leq x \leq 0$  (II)

دامنه:  $x=0$  یا  $x \geq 4 \rightarrow (I) \cap (II) \rightarrow$  هیچ تابعی در نقاط اطراف صفر تعریف نشده

s.a.m

الف)  $\lim_{x \rightarrow 1} [f(x)^2 - f(x)^2 + 3] \rightarrow \lim_{x \rightarrow 1} [3] = 3$

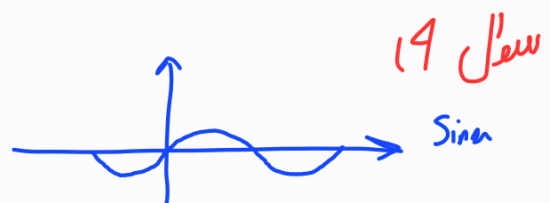


$y = f(x)^2 - f(x)^2 + 3 \rightarrow y' = 2f(x) - 2f(x) = 0 \rightarrow 2f(x)(1-x) = 0 \rightarrow \begin{cases} x=0 \\ x=1 \end{cases}$

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



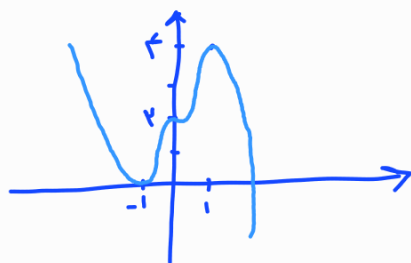
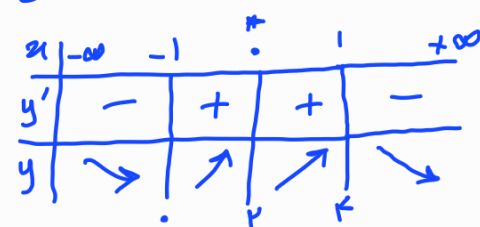
الف)  $\lim_{x \rightarrow 0^+} \frac{(-1)^{[ \sin x ]}}{x^2 - x^2} = \lim_{x \rightarrow 0^+} \frac{(-1)^{[ \cdot ]}}{x^2(x-1)} = \lim_{x \rightarrow 0^+} \frac{1}{0^-} = -\infty$



ب)  $\lim_{x \rightarrow 2} \frac{x^2 - [x^2]}{x - [x]} = \begin{cases} \lim_{x \rightarrow 2^+} \frac{x^2 - [x^2]}{x - [x]} = \lim_{x \rightarrow 2^+} \frac{x^2 - 4}{x - 2} = \lim_{x \rightarrow 2^+} x + 2 = 4 \\ \lim_{x \rightarrow 2^-} \frac{x^2 - [x^2]}{x - [x]} = \lim_{x \rightarrow 2^-} \frac{x^2 - 3}{x - 1} = \frac{4 - 3}{2 - 1} = 1 \end{cases}$

الف)  $y = 2x^3 - 3x^2 + 2$

$y' = 6x^2 - 6x = 0 \rightarrow 6x^2(1-x) = 0 \rightarrow \begin{cases} x=0 \\ x=1 \\ x=-1 \end{cases}$



سؤال 10

ب)  $y = x^2 - 2x + 3$

$y' = 2x - 2 = 0 \rightarrow 2x(x-1) = 0 \rightarrow \begin{cases} x=0 \\ x=1 \\ x=-1 \end{cases}$

