

۲۰

سوال ۱!

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

ب)  $\lim_{x \rightarrow 2^-} f(x) - 3 \rightarrow f(2) - 3 = 1 - 3 = -2$

۵

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

ب)  $\lim_{x \rightarrow 2^-} f[x] - 3 \rightarrow f[2^-] - 3 = f(1) - 3 = 4 - 3 = 1$

۵

سوال ۲

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

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

۵

سوال ۳

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

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

۵

سوال ۴

الف)  $\lim_{x \rightarrow 3} \frac{f(x) - 3}{x - 3}$   
 $\begin{cases} 3^+ \rightarrow \frac{f(3) - 3}{3^+ - 3} = \frac{11 - 3}{0^+} = \frac{8}{0^+} = +\infty \\ 3^- \rightarrow \frac{f(3) - 3}{3^- - 3} = \frac{11 - 3}{0^-} = \frac{8}{0^-} = -\infty \end{cases} \Rightarrow \text{حذف دارد}$

سوال ۵

ب)  $\lim_{x \rightarrow 3} \frac{f(x) - 3}{(x - 3)^2}$   
 $\begin{cases} 3^+ \rightarrow \frac{9}{0^+} = +\infty \\ 3^- \rightarrow \frac{9}{0^+} = +\infty \end{cases} \Rightarrow \text{حذف دارد}$

۵

الف)  $\lim_{x \rightarrow 3} \frac{f(x) - 3}{\sqrt{x} - 3}$   
 $\begin{cases} 3^+ \rightarrow \frac{f(3) - 3}{\sqrt{3^+} - 3} = \frac{11 - 3}{\sqrt{0^+}} = \frac{8}{0^+} = +\infty \\ 3^- \rightarrow \frac{f(3) - 3}{\sqrt{3^-} - 3} = \frac{11 - 3}{\sqrt{0^-}} = \frac{8}{\sqrt{0^-}} = \text{تعریف نشده} \end{cases} \Rightarrow \text{حذف دارد}$

سوال ۶

ب)  $\lim_{x \rightarrow 3} \frac{f(x) - 3}{\sqrt{x^2 - 4x + 3}}$   
 $\begin{cases} 3^+ \rightarrow \frac{f(3) - 3}{\sqrt{(3^+)^2 - 4(3^+) + 3}} = \frac{11 - 3}{\sqrt{9 - 12^+ + 3}} = \frac{8}{0^+} = +\infty \\ 3^- \rightarrow \frac{f(3) - 3}{\sqrt{(3^-)^2 - 4(3^-) + 3}} = \frac{11 - 3}{\sqrt{9 - 12^- + 3}} = \frac{8}{\sqrt{0^-}} = \text{تعریف نشده} \end{cases} \Rightarrow \text{حذف دارد}$

۵

الف)  $\lim_{x \rightarrow 3} \frac{f(x) - 3}{x^2 - 7x + 12}$   
 $\begin{cases} 3^+ \rightarrow \frac{f(3) - 3}{(3^+)^2 - 7(3^+) + 12} = \frac{11 - 3}{(0^+)(0^-)} = \frac{8}{0^-} = -\infty \\ 3^- \rightarrow \frac{f(3) - 3}{(3^-)^2 - 7(3^-) + 12} = \frac{11 - 3}{(0^-)(0^-)} = \frac{8}{0^+} = +\infty \end{cases} \Rightarrow \text{حذف دارد}$

سوال ۷

ب)  $\lim_{x \rightarrow 3} \frac{f(x) - 3}{[x - 3]}$   
 $\begin{cases} 3^+ \rightarrow \frac{f(3) - 3}{[3^+ - 3]} = \frac{11 - 3}{[0^+]} = \frac{8}{0} = \text{تعریف نشده} \\ 3^- \rightarrow \frac{f(3) - 3}{[3^- - 3]} = \frac{11 - 3}{[0^-]} = \frac{8}{-1} = -8 \end{cases} \Rightarrow \text{حذف دارد}$

۵

الف)  $\lim_{x \rightarrow 3} [3x] + [-2x]$   
 $\begin{cases} 3^+ \rightarrow [3(3^+)] + [-2(3^+)] = [9^+] + [-6^+] = 9 + (-6) = 3 \\ 3^- \rightarrow [3(3^-)] + [-2(3^-)] = [9^-] + [-6^-] = 8 + (-5) = 3 \end{cases} \Rightarrow 3$

سوال ۸

ب)  $\lim_{x \rightarrow -4} [-4x] + [2x]$   
 $\begin{cases} -4^+ \rightarrow [-4(-4^+)] + [2(-4^+)] = [16^-] + [-8^+] = 16 + (-8) = 8 \\ -4^- \rightarrow [-4(-4^-)] + [2(-4^-)] = [16^+] + [-8^-] = 16 + (-7) = 9 \end{cases} \Rightarrow 8$

۱۱

الف)  $\lim_{x \rightarrow 2} [x^2 - 2x] =$

$$\begin{aligned} & \xrightarrow{2^+} [2(2)^2 - 2(2)] = [4(2) - 4] = [8 - 4] = 4 \\ & \xrightarrow{2^-} [(2)^2 - 2(2)] = [4 - 4] = 0 \end{aligned} \Rightarrow \boxed{-4}$$

سوال 9

5

ب)  $\lim_{x \rightarrow 3} [9x - x^2] =$

$$\begin{aligned} & \xrightarrow{3^+} [9(3) - (3)^2] = [27 - 9] = 18 \\ & \xrightarrow{3^-} [9(3) - (3)^2] = [27 - 9] = 18 \end{aligned} \Rightarrow \boxed{18}$$

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

$$\begin{aligned} & \xrightarrow{2^+} \frac{x-2}{(x-2)(x-1)} = \frac{1}{x-1} = \frac{1}{2-1} = 1 \\ & \xrightarrow{2^-} \frac{-(x-2)}{(x-2)(x-1)} = \frac{-1}{x-1} = \frac{-1}{2-1} = -1 \end{aligned} \Rightarrow \boxed{\text{حد ندارد}}$$

سوال 10

5

ب)  $\lim_{x \rightarrow 1} \frac{x - [x]}{x^2 - 1} =$

$$\begin{aligned} & \xrightarrow{1^+} \frac{x - [1^+]}{x^2 - 1} = \frac{x-1}{(x-1)(x+1)} = \frac{1}{x+1} = \frac{1}{1+1} = \frac{1}{2} \\ & \xrightarrow{1^-} \frac{x - [1^-]}{x^2 - 1} = \frac{x-0}{x^2-1} = \frac{x}{(x-1)(x+1)} = \frac{1}{0^+} = +\infty \end{aligned} \Rightarrow \boxed{\text{حد ندارد}}$$