کلیات حد و پیوستگی

۱- ب) $\lim_{x \to 3^-} (4x - 3) = 4(3) - 3 = 9$

الف) $\lim_{x \to 3^+} (4x - 3) = 4(3) - 3 = 9$

۲- ب) $\lim_{x \to 3^-} [4x - 3] = [9^-] = 8$

الف) $\lim_{x \to 3^+} [4x - 3] = [9^+] = 9$

۳- ب) $\lim_{x \to 3^-} 4[x] - 3 = 4[3^-] - 3 = 4(2) - 3 = 5$

الف) $\lim_{x \to 3^+} 4[x] - 3 = 4[3^+] - 3 = 4(3) - 3 = 9$

۴- ب) $\left[\lim_{x \to 3^-} 4x - 3\right] = [9] = 9$

الف) $\left[\lim_{x \to 3^+} 4x - 3\right] = [9] = 9$

۵- ب) $\lim_{x \to 3^-} \frac{4x - 3}{(x-3)^2}$ حدناز

$3^+ \Rightarrow \frac{9}{0^+} = +\infty$

$3^- \Rightarrow \frac{9}{0^+} = +\infty$

الف) $\lim_{x \to 3} \frac{4x - 3}{x - 3}$ حدناز

$3^+ \Rightarrow \frac{9}{0^+} = +\infty$

$3^- \Rightarrow \frac{9}{0^-} = -\infty$

۶- ب) $\lim_{x \to 3^-} \frac{4x - 3}{\sqrt{x^2 - 4x + 3}}$

$3^+ \Rightarrow \frac{9}{0^+} = +\infty$

$3^- \Rightarrow$ تن

الف) $\lim_{x \to 3} \frac{4x - 3}{\sqrt{x - 3}}$

$3^+ \Rightarrow \frac{9}{0^+} = +\infty$

$3^- \Rightarrow$ تن

حل تمرین

۷- حدها

الف) $\lim_{x \to 3} \frac{4x-12}{x^2-7x+12} = \frac{4x-12}{(x-3)(x-4)}$

$3^+ \Rightarrow \frac{+}{0^-} = -\infty$

$3^- \Rightarrow \frac{+}{0^+} = +\infty$

ب) $\lim_{x \to 3} \frac{4x-12}{[x-3]}$

$3^+ \Rightarrow \frac{0}{0^+}$ تعریف نشده

$3^- \Rightarrow \frac{0}{[0^-]} = \frac{0}{-1} = 0$

۸- حدها

الف) $\lim_{x \to 3} [3x] + [-2x]$

$3^+ \Rightarrow 9 - 6 = 3$

$3^- \Rightarrow 8 - 9 = -1$

ب) $\lim_{x \to -4} [-4x] + [3x]$

$-4^+ \Rightarrow 16 - 11 = 5$

$-4^- \Rightarrow 15 - 12 = 3$

۹- حدها

الف) $\lim_{x \to 2} [x^2 - 4x] = \lim_{x \to 2} [x^2 - 4x + 4 - 4] = \lim_{x \to 2} [(x-2)^2 - 4]$

$2^+ \Rightarrow [(0^+)^2 - 4] = -4$

$2^- \Rightarrow [(0^-)^2 - 4] = -4$

ب) $\lim_{x \to 3} [4x - x^2] = \lim_{x \to 3} [-(x^2 - 4x + 9 - 9)] = \lim_{x \to 3} [-(x-3)^2 - 9]$

$3^+ \Rightarrow [-(0^+)^2 - 9] = -9$

$3^- \Rightarrow [-(0^-)^2 - 9] = -9$

۱۰- حدها

الف) $\lim_{x \to 1} \frac{x - [x]}{x^2 - 1}$

$1^+ \Rightarrow \frac{x-1}{(x-1)(x+1)} = \frac{1}{x+1} = \frac{1}{2}$

$1^- \Rightarrow \frac{x}{x^2-1} = \frac{1}{0^-} = -\infty$

ب) $\lim_{x \to 3} \frac{|x-4|}{x^2+x-12}$

$\frac{|x-4|}{(x-3)(x+4)}$

$3^+ - 0^+ + 4$

$3^+ \Rightarrow \frac{x-4}{(x-3)(x+4)} = \frac{1}{x+4} = \frac{1}{7}$

$3^- \Rightarrow \frac{-x+4}{(x-3)(x+4)} = -1$