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17/ENG05/030
MECHATRONICS ENGINEERING
ENG 281

1. $f(x) = \pi$

$\lim_{x \to 3} \pi = \pi$

2. $\lim_{x \to 6} (5x - 21)$

x	$f(x)$
6.1	9.5
6.01	9.05
6.001	9.005
6.0001	9.0005
6.00001	9.00005
6.000001	9.000005
6.0000001	9.0000005

Hence $f(x) = 5x - 21$ tends towards

3 $\lim_{x \to 3^+} \frac{3-x}{|3-x|} = \frac{3-(3+x)}{3-(3+x)} = \frac{0}{0}$

The limit at the right hand side is indeterminate

4. $\lim_{x \to 3} \frac{x-3}{|x-3|}$

$x \geq 0$

$\lim_{x \to 0^+} \left[\frac{([3+x]-3)}{([3+x]-3)} \right]$

$= \frac{3-3}{3-3} = \frac{0}{0}$; indeterminate.

$x < 0$

$\lim_{x \to 0^-} \left[\frac{([3-x]-3)}{([3-x]-3)} \right] = \frac{3-3}{3-3} = 0$; indeterminate

∴ The limit doesn't exist from the left to the right hand limit.

5. $f(x) = \sqrt{x-4}$ (intervals , 4, 8)

At $x = 4$

$f(x) = \sqrt{x-4}$

$\lim_{x \to 4} = \sqrt{4-4}$

$= \sqrt{0}$

$= 0$

$\therefore f(x) = \sqrt{4-4} = \sqrt{0}$

At $x = 8$

$\lim_{x \to 8} \sqrt{x-4} = \sqrt{8-4}$

$= \sqrt{4}$

$= 2$

$\therefore f(x) = \sqrt{8-4} = 2$

$\lim_{x \to [4,8]} f(x) = f(4, 8)$

$\therefore f(x)$ is continuous at $(4, 8)$