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17/ENG06/040
Mechanical Engineering
ENG281

1) $\lim_{x \to 3} f(x)$ $\quad f(x) = \pi$

Sol

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

2) $F(x) = 5x - 21$

Sol

$\delta = 0.1 \quad$ step 0.01

$5(6.1) - 21 = 9.5$
$5(6.01) - 21 = 9.05$
$5(6.001) - 21 = 9.005$
$5(6.0001) - 21 = 9.0005$
$5(6.00001) - 21 = 9.00005$
$5(6.000001) - 21 = 9.000005$
$5(6.0000001) - 21 = 9.0000005$
~~5(6.00000001) - 21 = 9.00000005~~

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

~~Sol~~ $\therefore$ $[F(x) = 5x - 21]$ tends towards 9 as $x \to 6$

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

Sol

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

$= \frac{0-h}{0-h} = \frac{h}{h}$

where $h = 0 = \frac{0}{0}$

$\therefore$ the limit is indeterminate at the right hand limit

~~4) $\lim_{x \to 3^-} \frac{x-3}{|x-3|}$~~

4) $\lim_{x \to 3} \frac{x-3}{|x-3|}$ at $x < 0$

Sol

$\lim_{x \to 3} \left[\frac{(3-h)-3}{(3-h)-3}\right] = \frac{0}{0}$ the indeterminate form

where $h \to 0$

at $x \geq 0$

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

where $h \to 0$ $= \frac{3-3}{3-3} = \frac{0}{0}$ i.e indeterminate form

~~at $x \geq 0$~~

$\therefore$ The limits do not exist from both left hand and right hand limit.

5) Show that $f(x) = \sqrt{x-4}$ is Continous on interval $[4, 8]$

Sol

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

$x \to 4$ $= \sqrt{4-4} = \sqrt{0} = 0$

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

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

$= \sqrt{4} = 2$

$\therefore f(x)$ is Continous at $[4, 8]$