30/09/18 FIDE-AKWUOBI ANTHONY CHIZALU 17/ENG06/037 MECHANICAL ENGINEERING ENG 281

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

$f(x) = \pi$

Solution

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

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

Solution

$\delta = 0.1$, step: 0.01

	x	$f(x)$
$\therefore 5(6.1) - 21 = 9.5$	6.1	9.5
$5(6.01) - 21 = 9.05$	6.01	9.05
$5(6.001) - 21 = 9.005$	6.001	9.005
$5(6.0001) - 21 = 9.0005$	6.0001	9.0005
$5(6.00001) - 21 = 9.00005$	6.00001	9.00005
$5(6.000001) - 21 = 9.000005$	6.000001	9.000005
$5(6.0000001) - 21 = 9.0000005$	6.0000001	9.0000005

$\therefore [f(x) = 5x - 21]$ tends towards 9 as $x \to 6$.

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

Solution

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

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

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

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

$\therefore$ At $x < 0$

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

where $h \to 0$

At $x \geq 0$

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

$\Rightarrow \frac{3-3}{3-3} = \frac{0}{0}$ $\therefore$ indeterm

$\therefore \frac{0}{0}$ i.e indeterminate form

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

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

Solution

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

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

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

At $x \to 8$. $\sqrt{8-4} = \sqrt{4} = 2$

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