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 DEPT → CIVIL ENG
 MATRIC → 17EN603/051

2) The model of a system has been developed by an engineer to be as given in the equation $f(x) = 5x - 21$. Given that $\delta = 0.1$ and using a step of 0.01, demonstrate, in tabular form, that the limit of the model as $x \rightarrow 6$ is equal to 9.

$f(x)$	$x - \delta$	$x = 6$	$x + \delta$	$f(x)$
8.50	5.90		6.10	9.50
8.55	5.91		6.09	9.45
8.60	5.92		6.08	9.40
8.65	5.93		6.07	9.35
8.70	5.94		6.06	9.30
8.75	5.95		6.05	9.25
8.80	5.96		6.04	9.20
8.85	5.97		6.03	9.15
8.90	5.98		6.02	9.10
8.95	5.99		6.01	9.05
9.00	6.00	↓	6.00	9.00

Since the limits are defined both on the L.H.S and R.H.S, so it can be said that the limit is real and thus, exists

3) Find the limit of the model equation given in Equation (3)

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

$$\lim_{x \rightarrow 3^+} \frac{3-x}{|3-x|} = \frac{3-(3+\delta)}{|3-(3+\delta)|} = \frac{3-3-\delta}{|3-3-\delta|}$$

$$= \frac{-\delta}{|-\delta|} = \frac{-\delta}{\delta} = -1$$

4) Estimate the limit of the model given $\lim_{x \rightarrow 3} \frac{x-3}{|x-3|}$

$$\lim_{x \rightarrow 3} \frac{x-3}{|x-3|} = \frac{(3)-3}{|(3)-3|} = \frac{0}{0} \text{ undefined}$$

Since the $\lim_{x \rightarrow 3} \frac{x-3}{|x-3|}$ is undefined, we substitute

$$(3+\delta) \text{ and } (3-\delta) \text{ for } x$$

$$\lim_{x \rightarrow 3^+} \frac{x-3}{|x-3|} = \frac{(3+\delta)-3}{|(3+\delta)-3|} = \frac{\delta}{\delta} = 1$$

$$\lim_{x \rightarrow 3^-} \frac{x-3}{|x-3|} = \frac{(3-\delta)-3}{|(3-\delta)-3|} = \frac{-\delta}{\delta} = -1$$

Therefore, since the R.H.S and L.H.S limits do not equal etc, the limit of $\frac{x-3}{|x-3|}$ as the equation tends to 3 doesn't exist

5) Show that the function given in equation $f(x) = \sqrt{x-4}$ is continuous on the interval $(4, 8)$.

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

$$\text{Substituting } 4 \text{ for } x, f(x) = \sqrt{(4)-4} = \sqrt{0} = 0$$

$$\text{Substituting } 8 \text{ for } x, f(x) = \sqrt{(8)-4} = \sqrt{4} = 2$$

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

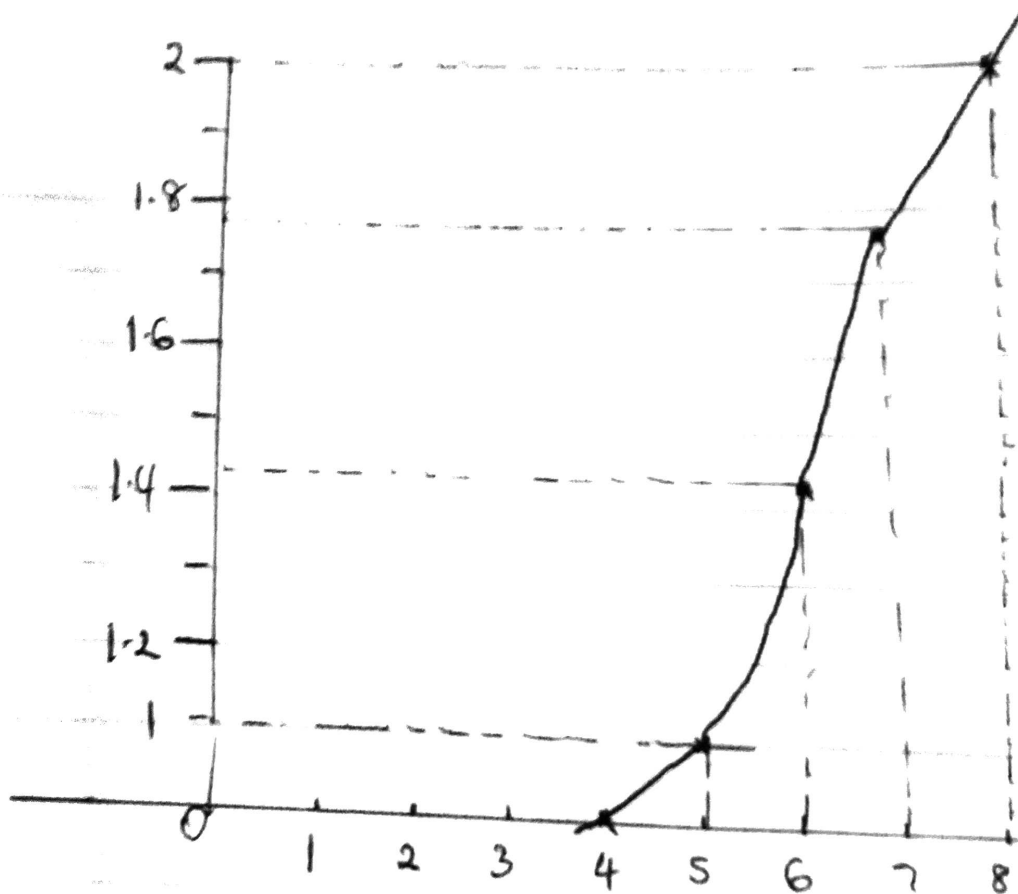
$$4 \quad 0$$

$$5 \quad 1.0$$

$$6 \quad 1.4$$

$$7 \quad 1.7$$

$$8 \quad 2$$



1) $f(x) = \pi$
 $\therefore \lim_{x \rightarrow \pi} f(x) = \pi$