

Chatterjee = Editor UY0X0

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Civil Engineering

1) Given a function $f(x)$ be as an equation 1:

$$f(x) = x^2 \quad \text{for } 1 \leq x < 3$$

$$x \rightarrow 3$$

$$f(x) = \pi$$

2) The model of a system has been deployed by an engineer to be as given in equation (2).

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

Given that $\epsilon = 0.1$ and using a step of 0.01 demonstrate in tabular form that unit of the model as $x \rightarrow b$ is equal to 4.

$f(x)$	$4 + \epsilon$	$4 + \delta$	$f(x)$
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 right hand limit (RHL) and left hand limit are equal to 4. Therefore,

$$\lim_{x \rightarrow 3} (5x - 2) = 4$$

$$x \rightarrow 3$$

3) Find the limit of the model given as

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

$$\lim_{x \rightarrow 3} \frac{3-x}{|3-x|} = \lim_{x \rightarrow 0} \frac{3-(3+h)}{|3-(3+h)|} = \frac{-h}{h} = \underline{\underline{-1}}$$

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

Soln

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

$$= \frac{3-3}{|3-3|} = \frac{0}{0}$$

= Undefined Hence, limit doesn't exist

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

x	f(x) = $\sqrt{x-4}$
4	0
5	1.0
6	1.4
7	1.7
8	2.0

