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17/ENGG031013.

CIVIL ENGR.

1) Given a function to be (1)

$$f(x) = x \text{ for } \lim_{x \rightarrow 3} f(x)$$

$$f(x) = 11.$$

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

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

Given that $\delta = -1$ and using a step of 0.01 demonstrate in tabular form that the model as $x \rightarrow 9$ is equal to 9.

$f(x)$	$9 - \delta$	$9 + \delta$	$f(x)$	
8.30	5.90	6.10	9.50	
8.35	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 9. Therefore;

$$\lim_{x \rightarrow 9} (5x - 21) = 9$$

3) Find the limit of the model given as

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1) Given a function to be (b)

$$f(x) = x \text{ for } \lim_{x \rightarrow 3} f(x).$$

$$f(x) = \pi.$$

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

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

Given that $\epsilon = -1$ and using a step of 0.01 demonstrate in tabular form that the model as $x \rightarrow 9$ is equal to 9.

$f(x)$	$9 - \epsilon$	$9 + \epsilon$	$f(x)$	
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Since the right hand limit (RHL) and Left hand limit are equal to 9. Therefore;

$$\lim_{x \rightarrow 9} (5x - 21) = 9$$

3) Find the limit of the model given as

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

Solution:

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

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

Solve

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

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

= undefined. Hence, limit doesn't exist.

5. Show that the function given in the expression 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

