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17 (ENIG03035)

Civil Engineering

1) Find $\lim_{x \rightarrow 3} f(x) = 11$

Solution

$$\lim_{x \rightarrow 3} f(x) = 11$$

$$x \rightarrow 3$$

$$1 = 11$$

2 The model of a system has been developed by an engineer to given in eq (1)

$$f(x) = 5x - 2 \quad \text{Given that } f = 0.1 \text{ and}$$

and using a step of 0.01, demonstrate in a table form that the limit of the model as $x \rightarrow 6$ is equal to 9

Sol

$f(x)$	$x - \epsilon$	$x + \epsilon$	$f(x)$
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

RHL & LHL are equal. $\lim_{x \rightarrow 6} (5x - 21) = 9$

3) Find the limit of the model given in equation

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

Solution

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

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

4) Evaluate the limit of the model given in the equation below if it exists $\lim_{x \rightarrow 3} \frac{x-3}{|x-3|}$

sol

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

The limit does not exist

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

The graph below shows that $f(x) = \sqrt{x-4}$ at intervals (4,8) is continuous because there is no point where the function is defined and the graph because a straight line graph

2

1

O

1

2

3

4

5

6

7

8

