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 ENA 281 [Engineering Mathematics 2].

(1) Given a function to be as in Equation (1).

$$f(x) = 1$$

find $\lim_{x \rightarrow 3} f(x)$

Solution

$$f(x) = 1$$

$$\lim_{x \rightarrow 3} = 1$$

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

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

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.

solution

$f(x)$	$a - \delta$	$a + \delta$	$f(x)$
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 and the left hand limit are equal to 9,

therefore we can say

$$\lim_{x \rightarrow 6} (5x - 21) = 9$$

Find the limit of the model equation given in Equation 3

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

Solution

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

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

$$= \frac{-x}{x}$$

$$= -1 //$$

(4) Evaluate the limit of the model given in Equation (4) if it exists.

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

Solution

$$\frac{3-3}{|3-3|} = \frac{0}{0} = \text{Undefined.}$$

Therefore, the limit does not exist.

(5) Show that the function given in Equation (5)

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

Solution

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

