

L.E	a-d	q	a+d	L+E
8.5	5.9	6	6.1	9.5
8.55	5.91		6.09	9.45
8.6	5.92		6.08	9.4
8.65	5.93		6.07	9.35
8.7	5.94		6.06	9.25
8.75	5.95		6.05	9.2
8.8	5.96		6.04	9.15
8.85	5.97		6.03	9.1
8.9	5.98		6.02	9.05
8.95	5.99		6.01	9
9	6		6	9

3) Show whether the function given in equation (1,3) is continuous on the interval [-5,6],
 $f(x) = (25 - x^2)^{1/2}$.

Solution

$$x \rightarrow -5$$

$$f(x) = (25 - (-5)^2)^{1/2} = 0$$

$$x \rightarrow -4$$

$$f(x) = (25 - (-4)^2)^{1/2} = 3$$

$$x \rightarrow -3$$

$$f(x) = (25 - (-3)^2)^{1/2} = 4$$

$$\rightarrow -2$$

$$f(x) = (25 - (-2)^2)^{1/2} = 4.58$$

$$\rightarrow -1$$

$$f(x) = (25 - (-1)^2)^{1/2} = 4.899$$

$$x \rightarrow 0$$

$$f(x) = (25 - (0)^2)^{1/2} \\ = 5$$

$$x \rightarrow 1$$

~~$$f(x) = (25 - (1)^2)^{1/2} \\ = 4.899$$~~

for LHL

$$\lim_{x \rightarrow 0} f(x) = (25 - x^2)^{1/2}$$

$$x \rightarrow 0 \quad h \rightarrow 0 \quad = \lim_{h \rightarrow 0} (5+h) = (25 - (5-0)^2)^{1/2}$$

$$= (25 - (5)^2)^{1/2}$$

$$= 0$$

Hence, $\lim_{x \rightarrow 0} f(x) = \lim_{x \rightarrow -5} f(x)$

i.e. $f(0) = f(-5)$

The $f(x) = (25 - x^2)^{1/2}$ is continuous on the interval $(-5, 5)$

Eng 281

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Assignment

1) Show that the limit of the function given in equation (1) as x approaches 0 is a/b .

$$f(x) = \frac{\sin ax}{bx}$$

Solution

$$f(x) = \frac{\sin ax}{bx}$$

$$\lim_{x \rightarrow 0} = \frac{\sin ax}{bx}$$

$$f(x) = \frac{\sin(ax)}{b(x)} = \frac{0}{0} \therefore \text{Undefined}$$

using L'Hopital's rule

$$f(x) = \frac{\sin ax}{bx}$$

$$f(x) = \frac{a \cos ax}{b} = \frac{a \cos(a \cdot 0)}{b} = \frac{a}{b}$$

2) The model of a system has been developed to be as given in equation (1.2) $f(x) = 5x - 21$. Given that $\sigma = 0.1$ and $\Delta \sigma = 0.01$, determine in a tabular form, that the limit of the model as $x \rightarrow 6$ is equal to 9.

Solution

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

$$\sigma = 0.1, \Delta \sigma = 0.01, a = 6$$

\therefore The limit of $f(x) = 5x - 21$ as $x \rightarrow 6$ is equal to 9.

Ans: 9