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

Soln

$f(x) = 5x - 21$

$\delta = 0.1, \quad \Delta\delta = 0.01, \quad a = 6$

L-e	a-δ	a	a+δ	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	9.3
8.75	5.95		6.05	9.25
8.8	5.96		6.04	9.2
8.85	5.97		6.03	9.15
8.9	5.98		6.02	9.1
8.95	5.99		6.01	9.05
9	6		6	9

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ENG 281

Assignment

1) Show that the limit of the function given in equation (1.1) as x approaches 0 is $\frac{a}{b}$.

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

Solution

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

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

$$f(x) = \frac{\sin a(0)}{b(0)} = \frac{0}{0} \therefore \text{(undefined)}$$

using l'hopital's rule

$$\lim_{x \to 0} f(x) = \frac{\sin ax}{bx}$$

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

(3) Show whether the function given in equation (1.3) is continous on the interval $[-5,5]$.

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

Soln

$x \to -5$

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

$= 0$

$x \to -4$

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

$= 3$

$x \to -3$

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

$= 4$

$x \to -2$

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

$= 4.58$

$x \to -1$

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

$= 4.899$

$x \to 0$

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

$= 5$

$x \to 1$

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

$= 4.899$

$x \to 2$

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

$= 4.58$

$x \to 3$

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

$= 4$

$x \to 4$

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

$= 3$

$x \to 5$

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

$\therefore$ The function on the interval $[-5, 5]$ is continous