

Solution

$F(x) = 5x - 21$ as $x \rightarrow 6$ Limit 9

$\delta = 0.1$ and $\Delta x = 0.01$

L.f	a = 8	a	"a+d	L.f.e
8.5	5.9	6	6.1	9.9
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

3) Show whether the function given in equation 1.3 is continuous on the interval $[-5, 5]$ $f(x) = (25 - x^2)^{1/2}$

Soln

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

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

From -5 to +5

$-5 \Rightarrow \sqrt{25 - (-5)^2} = 0$

$\sqrt{25 - (-4)^2} = 3$

$\sqrt{25 - (-3)^2} = 4$

$\sqrt{25 - (-2)^2} = 4.58$

$\sqrt{25 - (-1)^2} = 4.899$

$\sqrt{25 - (0)^2} = 5$

$\sqrt{25 - (1)^2} = 4.899$

$\sqrt{25 - (2)^2} = 4.58$

$\sqrt{25 - (3)^2} = 4$

$\sqrt{25 - (4)^2} = 3$

$\sqrt{25 - (5)^2} = 0$

$\therefore f(x) = \sqrt{25 - x^2}$ is continuous for all values from -5 to 5

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Assignment

1) Show that the limit of the function given in equation 1.1 as x approach 0 is a/b $f(x) = \frac{\sin ax}{bx}$

Solution

$$\lim_{x \rightarrow 0} \frac{\sin ax}{bx}$$
$$= \lim_{x \rightarrow 0} \sin ax \cdot \frac{1}{bx}$$

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

$$= \frac{a}{b} \times \lim_{x \rightarrow 0} \frac{\sin ax}{ax}$$

(Using $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$)

$$x = ax$$
$$= \frac{a}{b} \times 1 = \frac{a}{b}$$

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

2) The model of a system has been developed to be as given in equation $f(x) = 5x - 2$

Given that $\delta = 0.1$ and $\Delta \delta = 0.01$ diameter in standard form