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

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

Solution

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

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

Using L'hopitals rule

$$\lim_{x \to 0} \frac{a \cos ax}{b}$$

$$\lim_{x \to 0} = \frac{a \cos a \cdot 0}{b} = \frac{a \cos 0}{b} = \frac{a}{b}$$

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

2 The model of a system has been developed to be given in equation (1,2)

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

Given that $\delta = \cancel{0.01}$ 0.1 and $\Delta\delta = 0.01$, demonstrate in tabular form that the limit of the model as $x \to 6$ is equal to 9.

$L-\varepsilon$	$a-\delta$	a	$a+\delta$	$L+\varepsilon$	$L+\varepsilon$ (solutions)
8.50	5.90	6.00	6.10	9.50	$f(x)=5(x)-21=5(6.10)-21=9.50$
8.55	5.91	6.00	6.09	9.45	$f(x)=5(x)-21=5(6.09)-21=9.45$
8.60	5.92	6.00	6.08	9.40	$f(x)=5(x)-21=5(6.08)-21=9.40$
8.65	5.93	6.00	6.07	9.35	$f(x)=5(x)-21=5(6.07)-21=9.35$
8.70	5.94	6.00	6.06	9.30	$f(x)=5(x)-21=5(6.06)-21=9.30$
8.75	5.95	6.00	6.05	9.25	$f(x)=5(x)-21=5(6.05)-21=9.25$
8.80	5.96	6.00	6.04	9.20	$f(x)=5(x)-21=5(6.04)-21=9.20$
8.85	5.97	6.00	6.03	9.15	$f(x)=5(x)-21=5(6.03)-21=9.15$
8.90	5.98	6.00	6.02	9.10	$f(x)=5(x)-21=5(6.02)-21=9.10$
8.95	5.99	6.00	6.01	9.05	$f(x)=5(x)-21=5(6.01)-21=9.05$
9.00	6.00	6.00	6.00	9.00	$f(x)=5(x)-21=5(6.00)-21=9.00$

$L-\varepsilon$ (Solutions)

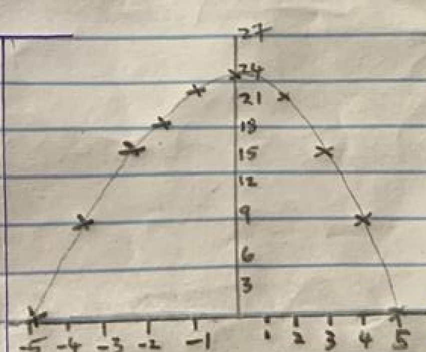
$f(x)=5x-21=5(5.90)-21=8.50$,
$f(x)=5x-21=5(5.91)-21=8.55$,
$f(x)=5x-21=5(5.92)-21=8.60$
$f(x)=5x-21=5(5.93)-21=8.65$
$f(x)=5x-21=5(5.94)-21=8.70$
$f(x)=5x-21=5(5.95)-21=8.75$
$f(x)=5x-21=5(5.96)-21=8.80$

$f(x)=5x-21=5(5.97)-21=8.85$
$f(x)=5x-21=5(5.98)-21=8.90$
$f(x)=5x-21=5(5.99)-21=8.95$
$f(x)=5x-21=5(6.00)-21=9.00$

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

Solution

$f(x)=(25-x^2)^{1/2}$ $[-5,5]$ $\Rightarrow f(x)=\sqrt{25-x^2}$
$f(x)=\sqrt{25-(-5)^2}=0$, $f(x)=f(-4)=\sqrt{25-(4)^2}=9$
$f(x)=\sqrt{25-(-3)^2}=16$, $f(x)=\sqrt{25-(-2}=21$
$f(x)=\sqrt{25-(-1)^2}=24$, $f(x)=\sqrt{25-(0)^2}=25$
$f(x)=\sqrt{25-(1)^2}=24$, $f(x)=\sqrt{25-(2)^2}=21$
$f(x)=\sqrt{25-(3)^2}=16$, $f(x)=\sqrt{25-(4)^2}=9$
$f(x)=\sqrt{25-(5)^2}=0$



A is continous at the interval of $(-5,5)$