NAME: ECHE AMANDA OGHOSA

MATRIC NO: 18/ENG08/005

DEPARTMENT: BIOMEDICAL ENGINEERING

COURSE CODE: ENG 281

COURSE TITLE: ENGINEERING MATHEMATICS 1.

ASSIGNMENT.

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

Soln.

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

$$f(x) = \frac{\sin a(0)}{b(0)} \quad * \text{indeterminate}$$

Using l'hopital's rule,

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

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

$$\lim_{x \to 0} f(x) = \frac{a \cos 0}{b} = \frac{a \times 1}{b} = \frac{a}{b}$$

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

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

Soln

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

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

Since $x \to 6$

$\therefore$ for $x = (6-\delta, 6+\delta)$

for $f(x) = (9-\delta, 9+\delta)$

x	f(x)	x	f(x)
5.9	8.50	6.1	9.5
5.91	8.55	6.09	9.45
5.92	8.60	6.08	9.40
5.93	8.65	6.07	9.35
5.94	8.70	6.06	9.30
5.95	8.75	6.05	9.25
5.96	8.80	6.04	9.20
5.97	8.85	6.03	9.15
5.98	8.90	6.02	9.10
5.99	8.95	6.01	9.05
6.00	9.00	6.00	9.00

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

Soln:

$f(x) = (25 - x^2)^{1/2} \quad * [-5, 5]$

at -5

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

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

when $x = -4$

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

$f(x) = (25 - 16)^{1/2} = 3$

when $x = -3$

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

$f(x) = (25 - 9)^{1/2} = 4$

when $x = -2$

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

when $x = -1$

$f(x) = (25 - (-1)^2)^{1/2} = 4.9$

when $x = 0$

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

when $x = 1$

$f(x) = (25 - (1)^2)^{1/2} = 4.9$

hen $x = 2$

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

hen $x = 3$

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

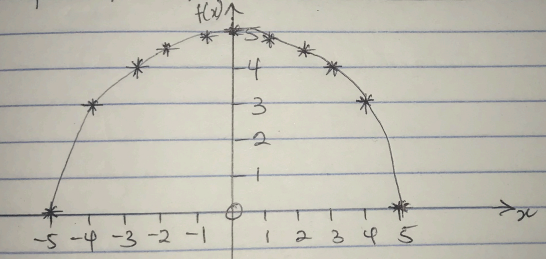
hen $x = 4$

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

hen $x = 5$

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

x	-5	-4	-3	-2	-1	0	1	2	3	4	5
$f(x)$	0	3	4	4.58	4.9	5	4.9	4.58	4	3	0



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