

Aqbar Rutili Mirah

ENG 041006

Electrical Electronics Engineering

ENG 281: Engineering Maths. I

2910912092

- 1) a) Show that the limit of the function given in equation (1.1) as x approaches 0 is a/b .

$$\text{eq. (1.1)} = f(x) = \frac{\sin ax}{bx}$$

Soln

$$x \rightarrow 0 \quad ; \quad \frac{\sin a(0)}{b(0)} = \frac{0}{0}$$

$$\text{Using L'Hopital's Rule} = \frac{\sin ax}{bx}$$

$$= \frac{a \cos ax}{b}$$

$$f(x)_{x \rightarrow 0} = \frac{a \cos(0)x}{b} = \frac{a}{b}$$

- b) 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 $\Delta \delta = 0.01$, demonstrate in a tabular form, that the limit of the model as $x \rightarrow 9$ is equal to 9.

Soln

$$\delta = 0.1 \quad \Delta \delta = 0.01 \quad \varepsilon = 0.05$$

$$6 - 0.1 = 5.9 \quad (\text{left hand rule})$$

$$6 + 0.1 = 6.1 \quad (\text{right " "})$$

$$9 - 0.5 = 8.5 \quad (\text{left " "})$$

$$9 + 0.5 = 9.5 \quad (\text{right " "})$$

$$= (16)^{\frac{1}{2}}$$

$$= 4$$

4) -2

$$(25 - x^2)^{\frac{1}{2}}$$

$$(25 - (-2)^2)^{\frac{1}{2}}$$

$$(21)^{\frac{1}{2}}$$

$$= 4.58$$

5) -1

$$(25 - x^2)^{\frac{1}{2}}$$

$$(25 - (-1)^2)^{\frac{1}{2}}$$

$$(24)^{\frac{1}{2}}$$

$$= 4.89$$

6) 0

$$(25 - (0)^2)^{\frac{1}{2}}$$

$$= (25)^{\frac{1}{2}}$$

$$= 5$$

7) 1

$$(25 - x^2)^{\frac{1}{2}}$$

$$(25 - (1)^2)^{\frac{1}{2}}$$

$$= (24)^{\frac{1}{2}}$$

$$= 4.89$$

8) 2

$$(25 - x^2)^{\frac{1}{2}}$$

$$(25 - 2^2)^{\frac{1}{2}}$$

$$(25 - 4)^{\frac{1}{2}}$$

$$(21)^{\frac{1}{2}}$$

$$= 4.58$$

9) 3

$$(25 - 3^2)^{\frac{1}{2}}$$

$$(25 - 9)^{\frac{1}{2}}$$

$$(16)^{\frac{1}{2}}$$

$$= 4$$

10) 4

$$(25 - 4^2)^{\frac{1}{2}}$$

$$(25 - 16)^{\frac{1}{2}}$$

$$(9)^{\frac{1}{2}}$$

$$= 3$$

11) 5

$$(25 - 5^2)^{\frac{1}{2}}$$

$$(25 - 25)^{\frac{1}{2}}$$

$$(0)^{\frac{1}{2}}$$

$$= 0$$

∴ The function is continuous

x	$f(x)$	x	$f(x)$
5.9	8.5	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
6.0	9	6.00	

3) Show whether the function given in Equation (1.3) is continuous on the interval $(-5, 5)$

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

① -5

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

$$= (0)^{1/2}$$

$$= 0$$

② -4

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

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

$$= (9)^{1/2}$$

$$= 3$$

③ -3

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

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