

Name: Boumann Khashm Sule

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Department: Civil Engineering

1) Using direct substitution  $\frac{\sin a(0)}{b(0)} = \frac{0}{0}$  undefined

Using L'Hopital's rule

$$f(x) = \frac{a \cos ax}{b} \quad (\text{first differential } \frac{d}{dx})$$

then use direct substitution again =  $\frac{a \cos a(0)}{b}$

$$= \frac{a+1}{b} = \frac{a}{b}$$

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

2)  $F(x) = 5x - 21$        $\delta = 0.1$      $\Delta\delta = 0.01$        $x \Rightarrow 6$

$L + \epsilon$	$x + \delta$	$a$	$a + \delta$	$L + \epsilon$
8.5	6.9	$\epsilon$	6.1	9.50
8.55	5.91		6.02	9.1
8.6	5.92		6.03	9.15
8.65	5.93		6.04	9.2
8.7	5.94		6.05	9.25
8.75	5.95		6.06	9.3
8.8	5.96		6.07	9.35
8.85	5.97		6.08	9.4
8.9	5.98		6.09	9.45
8.95	5.99		6.01	9.05
9.00	6.0		6.0	9.00

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

$$a < x < 9$$

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

$$\begin{aligned} \text{at } x = -5 \\ (25 - (-5)^2)^{1/2} \\ (25 - 25)^{1/2} \\ (0)^{1/2} \end{aligned}$$

$$f(-5) = 0$$

$$\begin{aligned} \text{at } x = -4 \\ (25 - (-4)^2)^{1/2} \\ (25 - 16)^{1/2} \\ (9)^{1/2} = \sqrt{9} = 3 \end{aligned}$$

$$f(-4) = 3$$

$$\text{at } x = -3$$

$$\begin{aligned} (25 - (-3)^2)^{1/2} \\ (25 - 9)^{1/2} \\ (16)^{1/2} = \sqrt{16} = 4 \end{aligned}$$

$$f(-3) = 4$$

$$\text{at } x = -2$$

$$\begin{aligned} (25 - (-2)^2)^{1/2} \\ (25 - 4)^{1/2} \\ (21)^{1/2} = 4.58 \end{aligned}$$

$$f(-2) = 4.58$$

$$\text{at } x = -1$$

$$\begin{aligned} (25 - (-1)^2)^{1/2} \\ (25 - 1)^{1/2} = (24)^{1/2} = 4.89 \end{aligned}$$

$$\begin{aligned} \text{at } x = 5 \\ (25 - (5)^2)^{1/2} \\ (25 - 25)^{1/2} \end{aligned}$$

$$f(5) = 0$$

$$\begin{aligned} \text{at } (x = 4) \\ (25 - (4)^2)^{1/2} \end{aligned}$$

$$\begin{aligned} (25 - 16)^{1/2} \\ (9)^{1/2} = \sqrt{9} = 3 \end{aligned}$$

$$f(4) = 3$$

$$\text{at } x = -3$$

$$\begin{aligned} (25 - (-3)^2)^{1/2} \\ (25 - 9)^{1/2} = (16)^{1/2} = \sqrt{16} = 4 \end{aligned}$$

$$f(3) = 4$$

$$\text{at } x = 2$$

$$\begin{aligned} (25 - (2)^2)^{1/2} \\ (25 - 4)^{1/2} \\ (21)^{1/2} = 4.58 \end{aligned}$$

$$f(2) = 4.58$$

$$\text{at } x = 1$$

$$\begin{aligned} (25 - (1)^2)^{1/2} \\ (25 - 1) \\ (24)^{1/2} = 4.89 \end{aligned}$$

Using these values to construct a graph

x	-5	-4	-3	-2	-1	0	1	2	3	4	5	with f(x)
f(x)	0	3	4	4.58	4.89	5	4.89	4.58	4	3	0	on y axis

