

OLOGBOSERE ANTHONIA EFE

MECHATRONICS

18/ENG05/049

ENG 281

29/09/2019

1.  $f(x) = \frac{\sin ax}{bx}$  as  $x \rightarrow 0$

By direct substitution,

$$f(x) = \frac{\sin(b \cdot 0)}{(b \cdot 0)} = \frac{0}{0}$$

It is undefined

Applying L'Hopital's Rule,

$$\lim_{x \rightarrow 0} \frac{a \cos ax}{b} = \frac{a \cos(a \cdot 0)}{b} = \frac{a \cdot 1}{b} = \frac{a}{b}$$

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

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

$L - \epsilon$	$a - \delta$	$a$	$a + \delta$	$L + \epsilon$
8.50	5.90	6	6.10	9.50
8.55	5.91	6	6.09	9.45
8.60	5.92	6	6.08	9.40
8.65	5.93	6	6.07	9.35
8.70	5.94	6	6.06	9.30
8.75	5.95	6	6.05	9.25
8.80	5.96	6	6.04	9.20
8.85	5.97	6	6.03	9.15
8.90	5.98	6	6.02	9.10
8.95	5.99	6	6.01	9.05
9.00	6.00	6	6.00	9.00

3.  $f(x) = (25 - x^2)^{1/2}$  at  $(-5, 5)$

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

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

$= 0^{1/2}$

$f(x) = 0$   
 $x \rightarrow -5$

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

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

$= 0^{1/2}$

$f(x) = 0$   
 $x \rightarrow 5$

Since,  $f(x) \in (25 - x^2)^{1/2} = f(x) = (25 - x^2)^{1/2} = 0$   
 $x \rightarrow -5$   $x \rightarrow 5$

Therefore, it is continuous at  $(-5, 5)$

Using graphical method,

$x$	-5	-4	-3	-2	-1	0	1	2	3	4	5
$y$	0	3	4	4.58	4.89	5	4.89	4.58	4	3	0

