

a) Show that the limit of the function given in Equations as x approaches 0 is a/b

Sol

$$f(x) = \frac{\sin ax}{bx} \quad x \rightarrow 0$$

$$= \frac{\sin(0)}{b(0)} = \frac{0}{0}$$

$$\frac{dy}{dx} = \frac{a \cos ax}{b} = \frac{a \cos(0)}{b} = \frac{a(1)}{b}$$

$$\text{as } x \rightarrow 0 = \frac{a}{b}$$

b) The model of a system has been developed to be as given in equation $f(x) = 5x - 2$, Given that $\delta = 0.1$ and $\Delta\theta = 0.01$ demonstrate in tabular form that the limit of the model as $x \rightarrow 6$ is equal to 9

L-E	a	a + \theta	K+E
8.5	5.9	6.1	9.5
8.55	5.91	6.09	9.45
8.6	5.92	6.08	9.4
8.65	5.93	6.07	9.35
8.7	5.94	6.06	9.3
8.75	5.95	6.05	9.25
8.8	5.96	6.04	9.2
8.85	5.97	6.03	9.15
8.9	5.98	6.02	9.1
8.95	5.99	6.01	9.05

c) Show whether the function given in equation (1.3) is continuous on the interval $(-5, 5)$. $f(x) = \sqrt{25-x^2}$

$$\lim_{x \rightarrow -5} = \sqrt{25 - (-5)^2} = 0$$

$$\lim_{x \rightarrow 5} = \sqrt{25 - (5)^2} = 0$$

Therefore the function is continuous

X	-5	-4	-3	-2	-1	0	1	2	3	4	5
y	0	3	4	4.6	4.9	5	4.9	4.6	4	3	0

