Given that $\delta = 0.1$ and $\Delta\delta = 0.01$, demonstrate in a tabular form, that the limit of the model as $x \to 6$ is equal to a

solution

$\delta = 0.1$, $\Delta\delta = 0.01$ · $\varepsilon = 0.05$

$6 - 0.1 = 5.9$ [left hand side]

$6 + 0.1 = 6.1$ [right hand side]

$9 - 0.5 = 8.5$ [left hand side]

$9 + 0.5 = 9.5$ [right hand side]

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
6.00	9.00	6.00	9.00

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

solution

$f = (25 - x^2)^{1/2}$ ~~$\in (-5,5) = F(x) =$~~

$x \to -4$

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

$= 4$

$x \to -2$

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

$= 4.58$

$x \to -1$

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

$= 4.89$

$x \to 0$

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

$= 5$

$x \to 1$

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

$= 4.89$

$x \to 2$

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

$= 4.58$

$x \to 3$

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

$= 4$

$x \to 4$

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

$= 3$

$x \to 5$

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

$= 0$

the function on the internal $[-5, 5]$ is continuous.

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

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

solution

$$f(x) = \frac{\sin ax}{bx} = \frac{\sin a(0)}{\sin b(0)} = \frac{0}{0} \{\text{Undefined}\}$$

using l'hopital's rule

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

$$\frac{a \cos axe}{b}$$

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

5) the model of a system has been developed to be as given in equation (1.2)

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