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MECHANICAL ENGINEERING

4 $F(x) = \lim_{x \to 0} \frac{\sin ax}{bx}$

By Direct Substitution $\rightarrow \frac{\sin a(0)}{b(0)} = \frac{0}{0}$

Using L'Hopital's rule

$$\lim_{x \to 0} \frac{\sin ax}{bx} = \lim_{x \to 0} \frac{a \cos ax}{b}$$

$$= \frac{a \cos a(0)}{b} = \frac{a \cos 0}{b}$$

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

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

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

$6 - \delta < x < 6 + \delta$

$6 - \delta = 6 - 0.1 = 5.9$

$6 + \delta = 6 + 0.1 = 6.1$

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	9.50

e $f(x) = (25-x^2)^{1/2}$ Over the interval $(-5,5)$

Finding the right hand limit at -5

$$\lim_{x \to -5^+} f(x) = \lim_{h \to 0} [25 - (-5+h)^2]^{1/2}$$

$$= \lim_{h \to 0} [25 - (25 - 10h + h^2)]^{1/2}$$

$$= [25 - 25]^{1/2}$$

$$= 0$$

Find the left hand limit at 5

$$\lim_{x \to 5^-} f(x) = \lim_{h \to 0} [25 - (5+h)^2]^{1/2}$$

$$= \lim_{h \to 0} [25 - (25 + h^2 + 10h)]^{1/2}$$

$$= \lim_{h \to \infty}$$

$$= \lim_{h \to 0} [25 - (25 + 0^2 + 10(0))]^{1/2}$$

$$= [25 - 25]^{1/2}$$

$$= 0$$

As the left hand limit = right hand limit $f(x)$ is Continous.