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18/ENG04/066 ELECT/ELECT

a) Show that the limit of the function $f(x) = \frac{\sin ax}{bx}$ as x approaches 0 is a/b

Solution

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

$$= \frac{\sin ax}{bx} = \frac{0}{0} \quad \ldots \text{ Indeterminate}$$

using L'hopitals rule

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

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

$$= a/b$$

b) $F(x) = 5x - 21$, $\delta = 0.1$, $\Delta\delta = 0.01$, $x \to 6$, $a = 6$

$L - \varepsilon$	$a - \delta$	a	$a + \delta$	$L + \varepsilon$
9.50	6.10	6	5.90	8.50
9.45	6.09	6	5.91	8.55
9.40	6.08	6	5.92	8.60
9.35	6.07	6	5.93	8.65
9.30	6.06	6	5.94	8.70
9.25	6.05	6	5.95	8.75
9.20	6.04	6	5.96	8.80
9.15	6.03	6	5.97	8.85
9.10	6.02	6	5.98	8.90
9.05	6.01	6	5.99	8.75
9.00	6.00	6	6.00	9.0

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c) Show whether the function $f(x) = (25-x^2)^{1/2}$ is continuous on the interval $[-5,5]$

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

when $x = -5$

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

$= \sqrt{0}$

$\Rightarrow 0$

when $x = 5$

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

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

$= \sqrt{0}$

$\Rightarrow 0$

∴ The functions given on the interval is continuous.