Otu Ekpo – Ekpenyong

ENG 281

17/ENG05/011

Engineering maths

Mechatronics

1) Given a function to be in equation (1)

$f(x) = \pi$

find $\lim_{x \to 3} f(x)$

2) the model of a system has been developed by an Engineer to be as given in Equation (2)

$f(x) = 5x - 21$

Given that $\delta = 0.1$, and using a step of 0.01, demonstrate in tabular form, that the limit of the model as $x \to 6$ is equal To 9.

3) find the limit of the model equation given in Equation

$$\lim_{x \to 3^{+}} \frac{3-x}{|3-x|}$$

4) Evaluate the limit of the model given in Equation (4) if its exist

$$\lim_{x \to 3} \frac{x-3}{|x-3|}$$

5) Show that the function given in Equation (5)

$f(x) = \sqrt{x-4}$

is Continous on the interval [4, 8]

Sol

$f(x) = \pi$

$\lim_{x \to 3} f(x).$

f(x)	x − δ	x = 6 x + δ	f(x)
8.50	5.90	6.10	9.50
8.55	5.91	6.09	9.45
8.60	5.92	6.08	9.40
8.65	5.93	6.07	9.35
8.70	5.94	6.06	9.30
8.75	5.95	6.05	9.25
8.80	5.96	6.04	9.20
8.85	5.97	6.03	9.15
8.90	5.98	6.02	9.10
8.95	5.99	6.01	9.05
9.00	6.00	6.00	9.00

Since the limits are defined both on the L.H.S and R.H.S, makes the limit real and thus, exist

3) $\lim_{x \to 3^+} \frac{3-x}{|3-x|} = \frac{3-(3+\delta)}{|3-(3+\delta)|} = \frac{3-3-\delta}{|3-3-\delta|} = \frac{-\delta}{|-\delta|} = \frac{-\delta}{\delta} = -1$ //

4) $\lim_{x \to 3} \frac{x-3}{|x-3|} = \frac{(3)-3}{|(3)-3|} = \frac{0}{0}$ (undefined)

∴ Stated limits can not be left as undefined, we have to substitute limits $\lim_{x \to 3} \frac{x-3}{|x-3|}$

$(3+\delta)$ and $(3-\delta)$ for x.

$\lim_{x \to 3^+} \frac{x-3}{|x-3|} = \frac{(3+\delta)-3}{|(3+\delta)-3|} = \frac{\delta}{\delta} = 1$ //

$\lim_{x \to 3^-} \frac{x-3}{|x-3|} = \frac{(3\delta)-3}{|(3-\delta)-3|} = \frac{-\delta}{\delta} = -1$ //

∴ the R.H.S and L.H.S limits are not colerating the limits of $\frac{x-3}{|x-3|}$ as the equation tends to, 3 doesn't exist

5). $f(x) = \sqrt{x-4}$

using 4 for x, $f(x) = \sqrt{(4)-4} = \sqrt{0} = 0$

using 8 for x, $f(x) = \sqrt{(8)-4} = \sqrt{4} = 2$

x	$f(x) = \sqrt{x-4}$
4	0
5	1.0
6	1.4
7	1.7
8	2