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COMPUTER ENGINEERING
17/ENG02/029
ENG281

1. Given a function to be as in Equation (1)

$f(x) = \bar{\Lambda}$

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

$f(x) = \bar{\Lambda}$

$\lim_{x \to 3} = \bar{\Lambda}$

2 The model of a system has been developed by an Engineer to be given in equation (2)

$f(x) = 5x - 21$

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

$\delta = 0.01 \quad x = 9$

n	n·δ	x − n δ = v	f(v) x → v
0	0	6−0 = 6	9
1	0·01	6−0·01 = 5·99	8·95
2	0·02	6−0·02 = 5·98	8·90
3	0·03	6−0·03 = 5·97	8·85
4	0·04	6−0·04 = 5·96	8·80
5	0·05	6−0·05 = 5·95	8·75
6	0·06	6−0·06 = 5·94	8·70
7	0·07	6−0·07 = 5·93	8·65
8	0·08	6−0·08 = 5·92	8·60
9	0·09	6−0·09 = 5·91	8·55
10	0·10	6−0·10 = 5·90	8·50

n	n.s	x+n s=v	flow, x → v
0	0	6+0 = 6	9
1	0.01	6+0.01 = 6.01	9.05
2	0.02	6+0.02 = 6.02	9.10
3	0.03	6+0.03 = 6.03	9.15
4	0.04	6+0.04 = 6.04	9.20
5	0.05	6+0.05 = 6.05	9.25
6	0.06	6+0.06 = 6.06	9.30
7	0.07	6+0.07 = 6.07	9.35
8	0.08	6+0.08 = 6.08	9.40
9	0.09	6+0.09 = 6.09	9.45
10	0.10	6+0.10 = 6.10	9.50

3. Find the limit of the model equation given in Equation 3

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

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

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

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

4. Evaluate the limit of the model given in Equation (4), if it exists

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

$$\lim_{x \to 3} = \frac{3-3}{3-3} = \frac{0}{0}$$

Differentiate

$$\frac{x}{|x|} = \frac{1}{1}$$

$$\lim_{x \to 3} = 1$$

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

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

is continuous on the interval $[4, 8]$

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

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

$y = (x-4)^{1/2}$ let $x-4 = u$.

$y = u^{1/2}$

$\frac{du}{dx} = 1$

$\frac{dy}{du} = 1/2 u^{-1/2}$.

$\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$.

$= 1 \cdot 1/2 u^{-1/2}$.

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

$= 1/2\sqrt{x-4}$

when $x = 4$

$\frac{1}{2\sqrt{4-4}} = 1/0$

at is indefinite at $x = 4$ so it is discontinuous

when $x = 8$

$\frac{1}{2\sqrt{8-4}} = 1/4$