

CHINEDUM PRUDENCE ES6

CHEMICAL ENGINEERING

19/ENGO1/007

ENG 231

1) Given the function $f(x) = x^2$. find $\lim_{x \rightarrow 3} f(x)$.

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

$$f(x) = 5x - 2$$

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

3) Find the limit of the model given in Equation (4) if it exists.

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

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

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

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

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

is continuous on the interval $(4, 8)$

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(2) $f(x)$	$x - \delta$	x	$x + \delta$	$f(x)$
8.05	5.90	6	6.1	9.50
8.55	5.91	6	6.09	9.45
8.60	5.92	6	6.08	9.40
8.65	5.93	6	6.07	9.35
8.70	5.94	6	6.06	9.30
8.75	5.95	6	6.05	9.25
8.80	5.96	6	6.04	9.20
8.85	5.97	6	6.03	9.15
8.90	5.98	6	6.02	9.10
8.95	5.99	6	6.01	9.05
9	6.0		6.00	9.00

The limit is defined both on the LHS & RHS. So it exists.

$$3.) \lim_{x \rightarrow 3^+} \frac{3-x}{|3-x|}$$

$$\lim_{x \rightarrow 3^+} \frac{3-x}{|3-x|} = \frac{3-3+\delta x}{|3-3+\delta x|} = \frac{\delta x}{\delta x} = 1$$

1) There is no value for x therefore the function is undefined.

4) Evaluate the limit of the model given

$$\lim_{x \rightarrow 3^+} \frac{x-3}{|x-3|} = \frac{3+\delta-3}{|3+\delta-3|} = \frac{\delta}{|\delta|} = 1$$

$$\lim_{x \rightarrow 3^-} \frac{x-3}{|x-3|} = \frac{3-\delta-3}{|3-\delta-3|} = \frac{-\delta}{|-\delta|} = \frac{-\delta}{\delta} = -1$$

$$\lim_{x \rightarrow 3} \frac{x-3}{|x-3|} = \frac{3-3}{|3-3|} = \frac{0}{0} = \text{Undefined.}$$

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

Subst for $x = 4 = \sqrt{4-4} = \sqrt{0} = 0$

Subst for $x = 8 = \sqrt{8-4} = \sqrt{4} = 2$

x component

f component

4

0

5

1.41

6

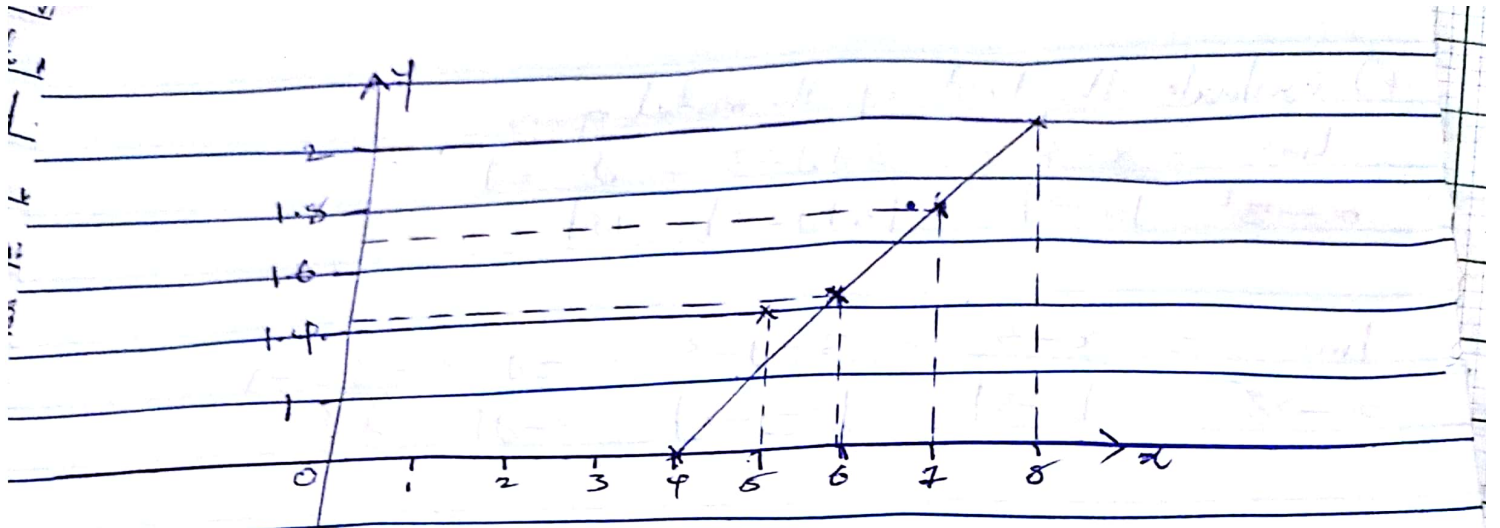
1.41

7

1.73

8

2



From the graph above, the function can be said to be continuous