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1) Given a function  $f(x) = \pi$  for  $\lim_{x \rightarrow 3} f(x)$

Since there is no function to substitute the limit of  $x$ , we can say that  $f(x) = \pi$

$$\begin{aligned}\pi &= \pi \\ &= 3.142\end{aligned}$$

2) The model of a system has been developed by an engineer to be as given in the equation  $f(x) = 5x - 21$ . Given that  $\delta = 0.1$ , and using a step  $-2$   $0.01$ , demonstrate, in a tabular form, that the limit of the model as  $x \rightarrow 6$  is equal to 9

$f(x)$	$x - \delta$	$x = 6$	$x + \delta$	$f(x)$
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

3) Find the limit Since the limits are defined both on the L.H.S and R.H.S so it can be said the limit is real and thus exists



3) Find the limit of the model question given below

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

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

$$= \frac{-\delta}{|-\delta|} = \frac{-\delta}{|\delta|} = -1$$

4) Evaluate the limit of the model given  $\lim_{x \rightarrow 3} \frac{x-3}{|x-3|}$

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

$$= \frac{(3)-3}{|(3)-3|} = \frac{0}{0} \text{ undefined}$$

Since the  $\lim_{x \rightarrow 3} \frac{x-3}{|x-3|}$  is undefined we substitute

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

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

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

Therefore since the R.H.S and L.H.S limits do not correlate the limits of  $\frac{x-3}{|x-3|}$  as the quest equation tends to

3 doesn't exist



5) Show that the function given in equation  $f(x) = \sqrt{x-4}$  is continuous on the interval  $(4, 8)$ .

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

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

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

