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1.) Given a function to be as  $f(x) = \pi$   
 Find  $\lim_{x \rightarrow 3} f(x)$

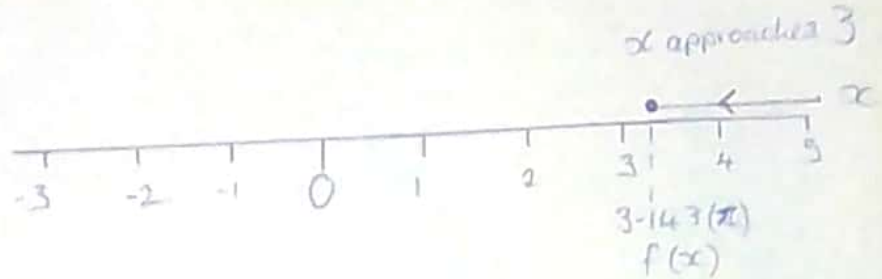
Answer

If  $\lim_{x \rightarrow 3} f(x) = \pi$

Then  $\lim_{x \rightarrow 3} f(3) = \pi$

Since  $\pi = 3.143$

$\therefore \lim_{x \rightarrow 3} f(x) = 3.143$



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

Answer

$x = 6$ ,  $\delta = 0.1$ , using step of 0.01

Condition	$x$	$f(x)$
Step of 0.01	$6 + 0.01$	$5(6.01) - 21 = 9.05$
$\delta = 0.1$	$6 + 0.1$	$5(6.1) - 21 = 9.5$
$x = 6$	6	$5(6) - 21 = 9$

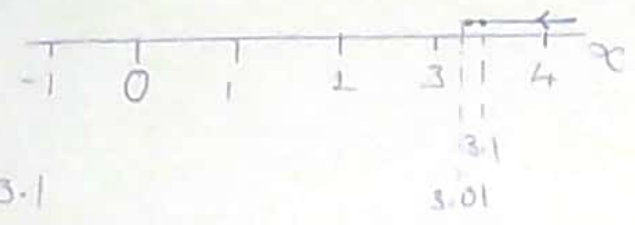
$\therefore \lim_{x \rightarrow 6} 5x - 21 = 9$

3) Find the limit of the model given as

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

Answer

Using  $x=3$   $\lim_{x \rightarrow 3^+} \frac{3-3}{|3-3|} = \frac{0}{0} = \text{Undefined}$



Using  $x=3.1$

$$\lim_{x \rightarrow 3^+} \frac{3-3.1}{|3-3.1|} = \frac{-0.1}{|-0.1|} = \frac{-0.1}{0.1} = -1$$

Using  $x=3.01$

$$\lim_{x \rightarrow 3^+} \frac{3-3.01}{|3-3.01|} = \frac{-0.01}{|-0.01|} = \frac{-0.01}{0.01} = -1$$

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

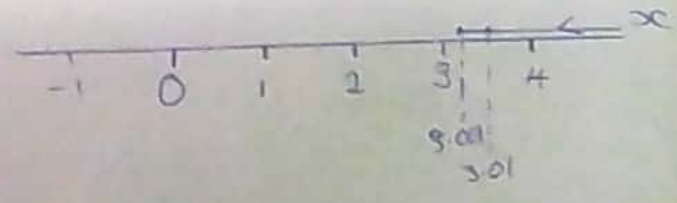
4) Evaluate the limit of the model given as  $\lim_{x \rightarrow 3} \frac{x-3}{|x-3|}$   
If it exists

Answer

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

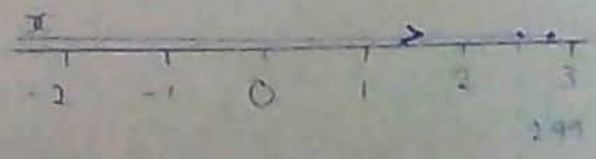
Using  $x=3.01 = \frac{3.01-3}{|3.01-3|} = 1$

Using  $x=3.001 = \frac{3.001-3}{|3.001-3|} = 1$



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

Using  $x=2.9 = \frac{2.9-3}{|2.9-3|} = -1$



Using  $x=2.99 = \frac{2.99-3}{|2.99-3|} = -1$

$$\lim_{x \rightarrow 3^+} \frac{x-3}{|x-3|} \neq \lim_{x \rightarrow 3^-} \frac{x-3}{|x-3|} \therefore \lim_{x \rightarrow 3} \frac{x-3}{|x-3|} = \text{Does not exist}$$

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

Answer

Interval	$F(x)$
4	0
5	1
6	1.4
7	1.7
8	2

