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1 $f(x) = \pi$, find $\lim_{x \to 2} f(x)$

Solution

$f(x)_{x \to 5} = \pi$

$\lim_{x \to 5} = \pi$

2 $\lim_{x \to 6} f(x)$

$\lim_{x \to 6} (5x - 21)$

$f(x)$	$x - \delta$	$x + \delta$	$f(x)$
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	6.0	6.00	9.00

From the table, the left hand and right hand limit all approach 9. Therefore, we say $\lim_{x \to 6} (5x - 21) = 9$

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

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

Solution

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

$= \lim_{h \to 0} \frac{3 - (3 + h)}{|3 - (3 + h)|}$

$= \frac{3 - 3 - h}{|3 - 3 - h|}$

$= \frac{-h}{|-h|}$

$= \frac{-h}{h} = -1$

4 Evaluate the limit of the model given the equation (4) if it exists

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

RHL : $\lim_{x \to 3^+} \frac{x - 3}{|x - 3|} = \lim_{h \to 0} \frac{(3 + h) - 3}{|(3 + h) - 3|}$

$= \frac{3 + h - 3}{|3 + h - 3|} = \frac{+h}{|+h|} = 1$

LHL : $\lim_{x \to 3^-} \frac{x - 3}{|x - 3|} = \lim_{h \to 0} \frac{(3 - h) - 3}{|(3 - h) - 3|}$

$= \frac{3 - h - 3}{|3 - h - 3|}$

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

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

$\therefore$ it does not exist

5 Show that the function given in equation (5)

$f(x) = \sqrt{x - 4}$ is continuous on the interval (4, 8)

at point $x = 4$

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

$\lim_{x \to 4} \sqrt{x - 4} = \sqrt{4 - 4}$

$= \sqrt{0} = 0$

at point $x = 8$

$\lim_{x \to 8} \sqrt{x - 4} = \sqrt{8 - 4}$

$= \sqrt{4}$

$= 2$

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

$= \sqrt{4 - 4} = \sqrt{0} = 0$

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

$= \sqrt{4} = 2$

$\lim_{x \to (4, 8)} f(x) = f(4, 8)$

Hence, $f(x)$ is continuous at (4, 8)