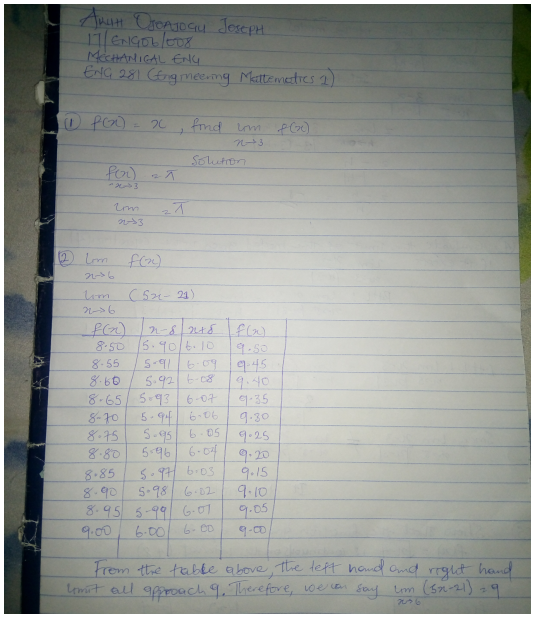

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Mechanical Eng
Eng 281 (Engineering Mathematics 2)

(1) $f(x) = 2x$, find $\lim_{x \to 3} f(x)$

Solution

$f(x)_{x \to 3} = 2(3)$

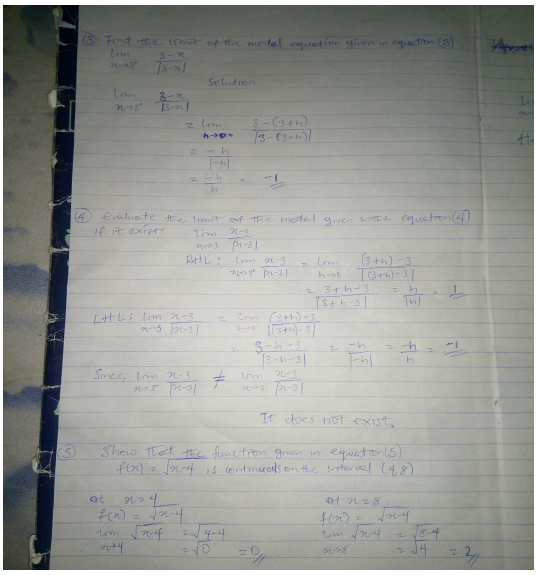
$\lim_{x \to 3} = 6$

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

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

$f(x)$	$x-0.5$	$x+0.5$	$f(x)$
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

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



(3) Find the limit of the modal equation given in equation (3)

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

Solution

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

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

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

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

(4) Evaluate the limit of the modal given in 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: $\lim_{x \to 3^-} \frac{x-3}{|x-3|} = \lim_{h \to 0} \frac{(3+h)-3}{|(3+h)-3|}$

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

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

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 $x = 4$

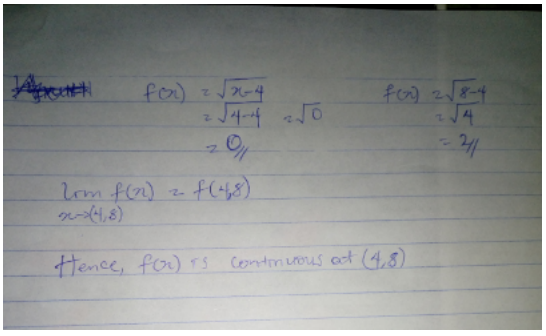
$f(x) = \sqrt{x-4}$

$\lim_{x \to 4} \sqrt{x-4} = \sqrt{4-4} = \sqrt{0} = 0$

at $x = 8$

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

$\lim_{x \to 8} \sqrt{x-4} = \sqrt{8-4} = \sqrt{4} = 2$



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

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

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

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