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17/ENG02/063

ENG 281 [Engineering Maths]

1. $f(x) = \pi$

$\lim_{x \to 3} \pi$

$\pi = 3.14$ or $\frac{22}{7}$

$\therefore \lim_{x \to 3} \pi = \frac{22}{7}$ because π is a constant.

2.

x^-	$f(x^-)$	x^+	$f(x^+)$
5.90	8.50	6.10	9.50
5.91	8.55	6.09	9.45
5.92	8.60	6.08	9.40
5.93	8.65	6.07	9.35
5.94	8.70	6.06	9.30
5.95	8.75	6.05	9.25
5.96	8.80	6.04	9.20
5.97	8.85	6.03	9.15
5.98	8.90	6.02	9.10
5.99	8.95	6.01	9.05
6.00	9.00	6.00	9.00

Since limits of x^+ and x^- are real and are both approaching ~~zero~~ 9.0, the limit of $f(x)$, $\lim_{x \to 6} = 5x - 21$ which is equal to 9.

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

let δ be a small increment in x

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

$$\lim_{x \to 3^+} \left[\frac{3-3-\delta}{|3-3-\delta|}\right] = \lim_{x \to 3^+} \left[\frac{-\delta}{|-\delta|}\right]$$

$= -1$

$\therefore$

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

4. $\lim_{x \to 3} \left[\frac{x-3}{|x-3|}\right]$

$$\lim_{x \to 3} \left[\frac{3-3}{|3-3|}\right] = \frac{0}{0} \text{ Indeterminate.}$$

$$\lim_{x \to 3^+} \left[\frac{x-3}{|x-3|}\right] = \frac{3+\delta-3}{|3+\delta-3|} = \lim_{x \to 3^+} \frac{\delta}{|\delta|}$$

$= 1$

- for $\lim_{x \to 3^-} \left[\frac{x-3}{|x-3|}\right]$

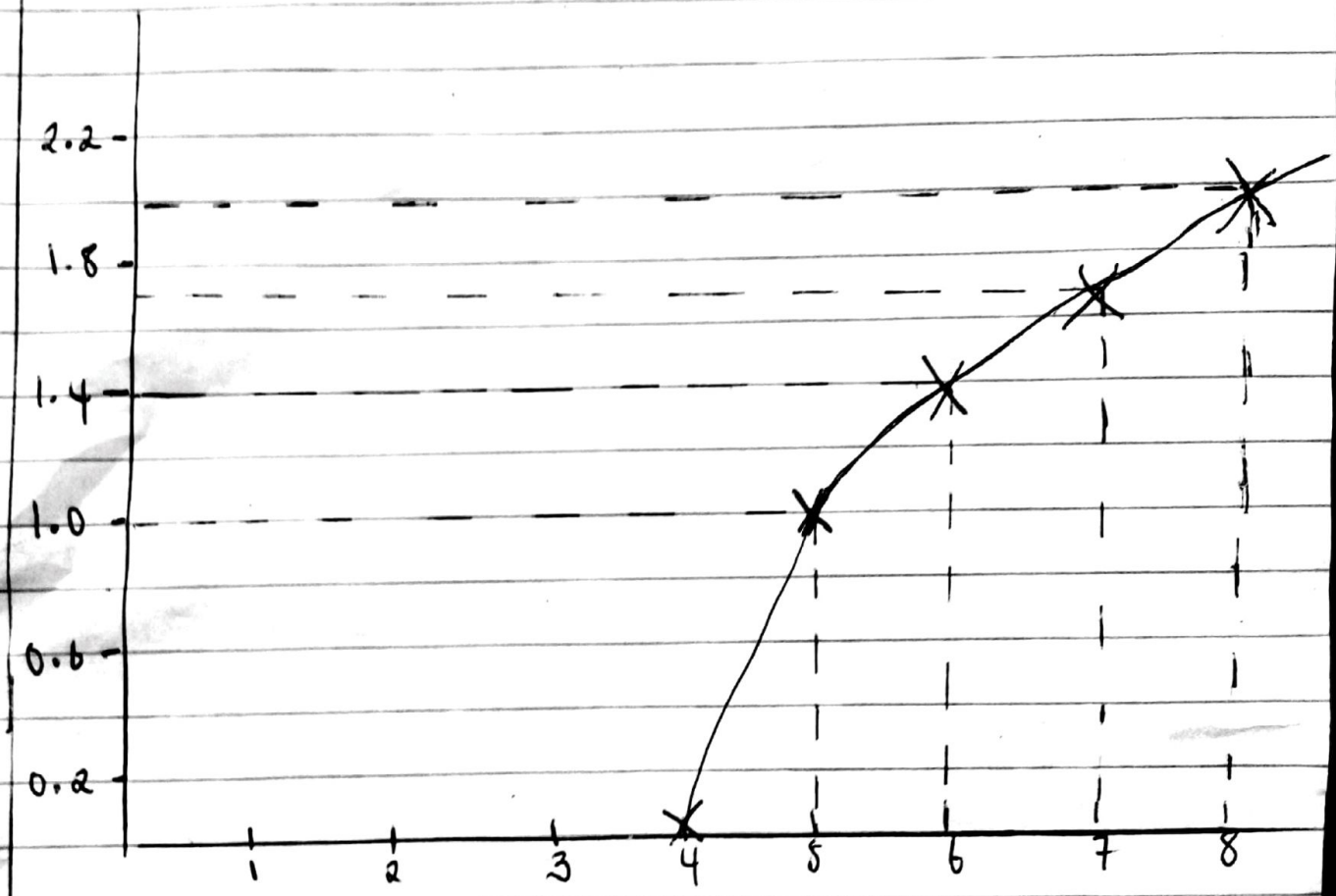
$$\lim_{x \to 3^-} \left[\frac{3-\delta-3}{|3-\delta-3|}\right] = \lim_{x \to 3^-} \left[\frac{-\delta}{|-\delta|}\right]$$

$$\lim_{x \to 3^-} \left[\frac{-\delta}{\delta}\right] = -1$$

Since both limits are not equal, the $\lim_{x \to 3}$ doesn't exist.

5.

x	$f(x)$
4	0.00
5	1.00
6	1.41
7	1.73
8	2.00



It is a continous graph since it is not a straight-line graph.