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ENG281 (200L)

1) Given a function to be as in $f(x) = \pi$, find $\lim_{x \to 3} f(x)$

Solution

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

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 of 0.01, demonstrate in tabular form, the model as $x \to 6$ equal to 9.

Solution

Lm	10 - δ	δ	a + δ	Lm
8.5	5.90		6.1	9.5
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

Since the right hand limit and left-hand limit are equal to
Therefore $\lim_{x \to 6}(5x - 21) = 9$

3) $\lim_{x \to 3} = \frac{3 - x}{|3 - x|} = \lim_{x \to 0} = \frac{3 - (3 + x)}{|3 - (3 + x)|} = \frac{3 - 3 - x}{|3 - 3 + x|} = \frac{-\delta}{-\delta} = \frac{-1}{=}$

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

Solution

at $x < 0$

$\lim_{x \to 3} \left[\frac{(3-h)-3}{(3-h)-3}\right] = \frac{0}{0}$ ∴ Indeterminate form

at $x \to 0$

$\lim_{x \to 3^+} \left[\frac{(3+h)-3}{(3+h)-3}\right]$ where $h \to 0$ $= \frac{3-3}{3-3} = \frac{0}{0}$ ∴ Indeterminate form

∴ The limits do not exist from both left hand and right hand limits.

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

Solution

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

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

∴ $f(x) = \sqrt{x-4}$

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

$= \sqrt{4} = 2$

∴ $f(x)$ is continuous at $(4, 8)$