

Basic Calculus Part 2 Moon

What is limit?

$$\boxed{\lim_{x \rightarrow a} f(x)}$$

↳ Left hand limit

$$\boxed{\lim_{x \rightarrow a^-} f(x)}$$

$$\begin{aligned} f(x) &= x^2 \\ a &= 2 \end{aligned}$$

$$\lim_{x \rightarrow 2^-} x^2 \Rightarrow 4$$

$$x \Rightarrow 1.5 \Rightarrow y \Rightarrow 2.25$$

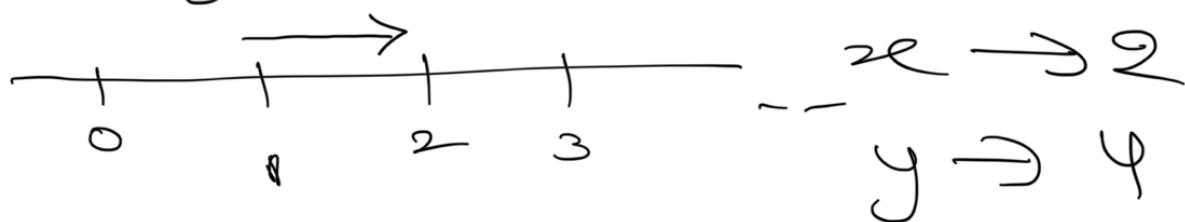
$$x \Rightarrow 1.7 \Rightarrow y \Rightarrow 2.89$$

$$x \Rightarrow 1.9 \Rightarrow y \Rightarrow 3.81$$

$$x \rightarrow 1.99 \Rightarrow y \Rightarrow 3.960$$

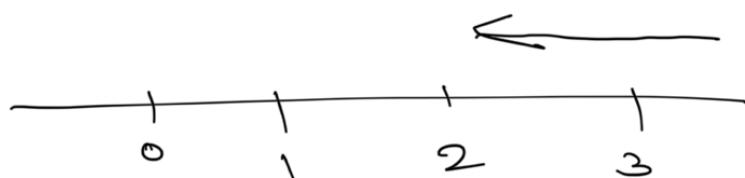
$$x \rightarrow 1.999 \Rightarrow y \Rightarrow 3.99600$$


left hand side



Right hand Limit

$$\lim_{x \rightarrow 2^+} x^2 \Rightarrow 4$$



$$x \Rightarrow 2.1 \Rightarrow 4.41$$

$$x \Rightarrow 2.01 \Rightarrow 4.0401$$

$$x \Rightarrow 2.001 \Rightarrow 4.004$$

11
 SS \downarrow
 y

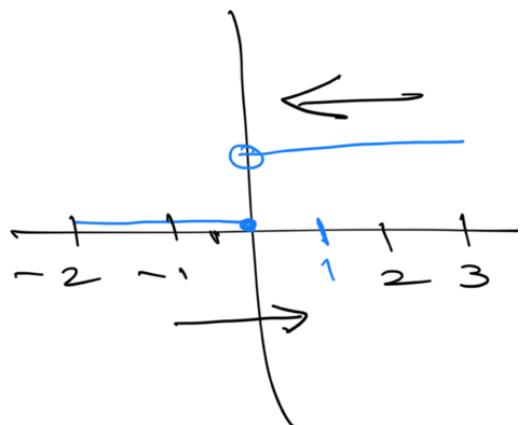
Step Function

$$f(x) = \begin{cases} 1 & : x > 0 \\ 0 & : x \leq 0 \end{cases}$$

$$\lim_{x \rightarrow 1^-} f(x)$$

L.H.L

$$\boxed{\lim_{x \rightarrow 1^-} f(x) = 1}$$



$$0.9 = 1$$

$$0.99 = 1$$

$$0.999 = 1$$

R.H.L

$$\lim_{x \rightarrow 1^+} f(x) = 1$$

$$1.1$$

$$1.01$$

$$1.001$$

$$1.0001$$

$$\boxed{L.H.L = R.H.L} \quad \text{for } x=0$$

$\Rightarrow f(x)$ is continuous at point 1.

L.H.L

$$\lim_{x \rightarrow 0^-} f(x) = 0$$

$$\begin{array}{c} -0.0 \\ -0.9 \\ \downarrow \\ 0 \end{array}$$

R.H.L

$$\lim_{x \rightarrow 0^+} f(x) = 1$$

$$\begin{array}{c} 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ \downarrow \\ 0_+ \end{array}$$

$$L.H.L = R.H.L \times$$

$\neq 0$

$f(x)$ is not continuous at point 0

