

Limit Laws

Building blocks

Constant function:

$$\lim_{x \rightarrow c} k = k$$

Identity Function:

$$\lim_{x \rightarrow c} x = c$$

Given

$$\lim_{x \rightarrow c} f(x) = L \quad \text{and} \quad \lim_{x \rightarrow c} g(x) = M$$

$$|f(x) - L| \leq \epsilon \text{ if } |x - c| \leq \delta$$

$$a \lim_{x \rightarrow c} f(x) + b \lim_{x \rightarrow c} g(x) = aL + bM$$

like limits are linear

$$(f + g)(x) = f(x) + g(x) \Rightarrow \lim_{x \rightarrow c} ((f + g)(x)) = \lim_{x \rightarrow c} (f(x) + g(x))$$

$$\lim_{x \rightarrow c} (f + g)(x) = \lim_{x \rightarrow c} f(x) + \lim_{x \rightarrow c} g(x) = L + M$$

$$\lim_{x \rightarrow c} (f * g)(x) = \lim_{x \rightarrow c} f(x) * \lim_{x \rightarrow c} g(x) \quad (\text{This also includes constant multiplies of the form})$$

$$\lim_{x \rightarrow c} cf(x) = c \left(\lim_{x \rightarrow c} f(x) \right)$$

$$\lim_{x \rightarrow c} f(x)^n = \left(\lim_{x \rightarrow c} f(x) \right)^n \text{ for } n \in \mathbb{Q}_{>0}$$

...

Polynomials $\lim_{x \rightarrow c} f(x) = f(c)$

Works for rational fcn if you don't div zero