$$\exists f'(a) \Rightarrow \lim_{x\to a} f(x) = f(a)$$

$\exists f'(a) \Rightarrow \lim_{x \to a} f(x) = f(a)$

Start

Start

Theorem

Start

Theorem

$$\exists f'(a)$$

Start

Theorem

$$\exists f'(a) \Rightarrow$$

Start

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$$\exists f'(a) \Rightarrow \lim_{x \to a} f(x) = f(a)$$

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Theorem

$$\exists f'(a) \Rightarrow \lim_{x \to a} f(x) = f(a)$$

Proof.

Start

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$$\exists f'(a) \Rightarrow \lim_{x \to a} f(x) = f(a)$$

Proof.

$(\Rightarrow)$

▸ Start

Theorem

$$\exists f'(a) \Rightarrow \lim_{x \to a} f(x) = f(a)$$

Proof.

$(\Rightarrow)$

$$\lim_{x \to a} f(x)$$

Start

Theorem

$$\exists f'(a) \Rightarrow \lim_{x \to a} f(x) = f(a)$$

Proof.

$(\Rightarrow)$

$$\lim_{x \to a} f(x) = \lim_{x \to a} \{f(x)$$

Start

Theorem

$$\exists f'(a) \Rightarrow \lim_{x\to a} f(x) = f(a)$$

Proof.

$(\Rightarrow)$

$$\lim_{x\to a} f(x) = \lim_{x\to a} \{f(x) - f(a) + f(a)\}$$

Start

Theorem

$$\exists f'(a) \Rightarrow \lim_{x\to a} f(x) = f(a)$$

Proof.

$(\Rightarrow)$

$$\begin{aligned}\lim_{x\to a} f(x) &= \lim_{x\to a} \{f(x) - f(a) + f(a)\} \\ &= \lim_{x\to a} \left\{\frac{f(x) - f(a)}{x - a}\right.\end{aligned}$$

Start

Theorem

$$\exists f'(a) \Rightarrow \lim_{x\to a} f(x) = f(a)$$

Proof.

$(\Rightarrow)$

$$\begin{aligned}\lim_{x\to a} f(x) &= \lim_{x\to a} \{f(x) - f(a) + f(a)\} \\ &= \lim_{x\to a} \left\{\frac{f(x) - f(a)}{x - a} \times (x - a)\right.\end{aligned}$$

Start

Theorem

$$\exists f'(a) \Rightarrow \lim_{x\to a} f(x) = f(a)$$

Proof.

$(\Rightarrow)$

$$\begin{aligned}\lim_{x\to a} f(x) &= \lim_{x\to a} \{f(x) - f(a) + f(a)\} \\ &= \lim_{x\to a} \left\{\frac{f(x)-f(a)}{x-a} \times (x-a) + f(a)\right\}\end{aligned}$$

Start

Theorem

$$\exists f'(a) \Rightarrow \lim_{x\to a} f(x) = f(a)$$

Proof.

($\Rightarrow$)

$$\begin{aligned}
\lim_{x\to a} f(x) &= \lim_{x\to a} \{f(x) - f(a) + f(a)\} \\
&= \lim_{x\to a} \left\{ \frac{f(x)-f(a)}{x-a} \times (x-a) + f(a) \right\} \\
&= \lim_{x\to a} \frac{f(x)-f(a)}{x-a}
\end{aligned}$$

Start

Theorem

$$\exists f'(a) \Rightarrow \lim_{x\to a} f(x) = f(a)$$

Proof.

$(\Rightarrow)$

$$\begin{aligned} \lim_{x\to a} f(x) &= \lim_{x\to a} \{f(x) - f(a) + f(a)\} \\ &= \lim_{x\to a} \left\{ \frac{f(x) - f(a)}{x - a} \times (x - a) + f(a) \right\} \\ &= \lim_{x\to a} \frac{f(x) - f(a)}{x - a} \times \lim_{x\to a} (x - a) \end{aligned}$$

Start

Theorem

$$\exists f'(a) \Rightarrow \lim_{x\to a} f(x) = f(a)$$

Proof.

$(\Rightarrow)$

$$\begin{aligned}
\lim_{x\to a} f(x) &= \lim_{x\to a} \{f(x) - f(a) + f(a)\} \\
&= \lim_{x\to a} \left\{ \frac{f(x) - f(a)}{x - a} \times (x - a) + f(a) \right\} \\
&= \lim_{x\to a} \frac{f(x) - f(a)}{x - a} \times \lim_{x\to a} (x - a) + f(a)
\end{aligned}$$

Start

Theorem

$$\exists f'(a) \Rightarrow \lim_{x\to a} f(x) = f(a)$$

Proof.

$(\Rightarrow)$

$$\begin{aligned}
\lim_{x\to a} f(x) &= \lim_{x\to a} \{f(x) - f(a) + f(a)\} \\
&= \lim_{x\to a} \left\{ \frac{f(x) - f(a)}{x - a} \times (x - a) + f(a) \right\} \\
&= \lim_{x\to a} \frac{f(x) - f(a)}{x - a} \times \lim_{x\to a} (x - a) + f(a) = f(a)
\end{aligned}$$

Start

Theorem

$$\exists f'(a) \Rightarrow \lim_{x\to a} f(x) = f(a)$$

Proof.

$(\Rightarrow)$

$$\begin{aligned}
\lim_{x\to a} f(x) &= \lim_{x\to a} \{f(x) - f(a) + f(a)\} \\
&= \lim_{x\to a} \left\{\frac{f(x)-f(a)}{x-a} \times (x-a) + f(a)\right\} \\
&= \lim_{x\to a} \frac{f(x)-f(a)}{x-a} \times \lim_{x\to a}(x-a) + f(a) = f(a)
\end{aligned}$$

$(\not\Leftarrow)$

Start

Theorem

$$\exists f'(a) \Rightarrow \lim_{x\to a} f(x) = f(a)$$

Proof.

$(\Rightarrow)$

$$\begin{aligned}\lim_{x\to a} f(x) &= \lim_{x\to a} \{f(x) - f(a) + f(a)\} \\ &= \lim_{x\to a} \left\{\frac{f(x)-f(a)}{x-a} \times (x-a) + f(a)\right\} \\ &= \lim_{x\to a} \frac{f(x)-f(a)}{x-a} \times \lim_{x\to a}(x-a) + f(a) = f(a)\end{aligned}$$

$(\not\Leftarrow)$

$$f(x) = |x|$$

Start

Theorem

$$\exists f'(a) \Rightarrow \lim_{x\to a} f(x) = f(a)$$

Proof.

$(\Rightarrow)$

$$\begin{aligned}
\lim_{x\to a} f(x) &= \lim_{x\to a} \{f(x) - f(a) + f(a)\} \\
&= \lim_{x\to a} \left\{\frac{f(x)-f(a)}{x-a} \times (x-a) + f(a)\right\} \\
&= \lim_{x\to a} \frac{f(x)-f(a)}{x-a} \times \lim_{x\to a}(x-a) + f(a) = f(a)
\end{aligned}$$

$(\not\Leftarrow)$

$$f(x) = |x| \text{ at } x = 0$$

Start

Theorem

$$\exists f'(a) \Rightarrow \lim_{x \to a} f(x) = f(a)$$

Proof.

$(\Rightarrow)$

$$\begin{aligned}
\lim_{x \to a} f(x) &= \lim_{x \to a} \{f(x) - f(a) + f(a)\} \\
&= \lim_{x \to a} \left\{ \frac{f(x) - f(a)}{x - a} \times (x - a) + f(a) \right\} \\
&= \lim_{x \to a} \frac{f(x) - f(a)}{x - a} \times \lim_{x \to a} (x - a) + f(a) = f(a)
\end{aligned}$$

$(\not\Leftarrow)$

$$f(x) = |x| \text{ at } x = 0$$

□

$\exists f'(a) \Rightarrow \lim_{x\to a} f(x) = f(a)$

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