L'Hospital's Rule

Theorem (5.13)

Suppose f *and* g *are real and differentiable in* (a, b) *and* $g'(x) \neq 0$ *for all* $x \in (a, b)$*, where* $-\infty \leq a < b \leq \infty$*. Suppose*

$$\frac{f'(x)}{g'(x)} \to A \text{ as } x \to a$$

If

$$f(x) \to 0 \text{ and } g(x) \to 0 \text{ as } x \to a$$

or if

$$g(x) \to +\infty \text{ as } x \to a$$

then

$$\frac{f(x)}{g(x)} \to A \text{ as } x \to a$$

Derivatives of a Higher Order

Definition (5.14)

- If f is differentiable on (a, b) we denote its derivative by f'
- If f' is differentiable on (a, b) we denote its derivative by f''
- If f'' is differentiable on (a, b) we denote its derivative by $f^{(3)}$
- If $f^{(n)}$ is differentiable on (a, b) we denote its derivative by $f^{(n+1)}$