L'Hopital's Rule

$$\lim_{x \to 5} \frac{\boxed{x^2 - 25}}{\boxed{5 + 4x - x^2}} \qquad \boxed{\frac{0}{0}} \quad \frac{\infty}{\infty}$$

$$\lim_{x \to a} \frac{f(x)}{g(x)} = \lim_{x \to a} \frac{\cancel{f(a)} + f'(a)\cancel{(x-a)}}{\cancel{g(a)} + g'(a)\cancel{(x-a)}} = \lim_{x \to a} \frac{f'(a)}{g'(a)}$$

L'Hopital's Rule

If $\lim\limits_{x \to a} \frac{f(x)}{g(x)}$ is of indeterminant form

then $\lim\limits_{x \to a} \frac{f(x)}{g(x)} = \lim\limits_{x \to a} \frac{f'(x)}{g'(x)}$

$$\lim_{x \to 5} \frac{x^2-25}{5+4x-x^2} = \lim_{x \to 5} \frac{2x}{4-2x} = -\frac{10}{6}$$

$$\lim_{x \to 9} \frac{\sqrt{x} - 3}{x - 9} = \lim_{x \to 9} \frac{\frac{1}{2\sqrt{x}}}{1} = \frac{1}{6}.$$

$$\lim_{x \to 0} \frac{\sin x}{x} = \lim_{x \to 0} \frac{\cos x}{1} = 1$$

$$\lim_{x \to 0} \frac{\sin 8x}{3x} = \lim_{x \to 0} \frac{8 \cos 8x}{3} = \frac{8}{3}.$$

Liebniz

L'Hopital Jabob John Bernoulli Nicklos

Jack

$\boxed{\text{Euler}}$

$f(x)$

Σ

e

i

$\frac{1}{3}$

$\sin x$

$a, b, c.$

$x\ y\ z$