L'Hopital's Rule

$$y - y_1 = m(x - x_1)$$

$$y = y_1 + m(x - x_1)$$

$$\underline{L(x) = f(a) + f'(a)(x-a)}$$

f @ $x = a$

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

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

<u>L'Hopital's Rule</u> $$= \lim_{x \to a} \frac{f'(a)}{g'(a)}$$

If $\lim_{x \to a} \frac{f(x)}{g(x)}$ is of indeterminant form $\left(\frac{0}{0}\right)$

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

$$\lim_{x \to 5} \frac{x^2 - 25}{x - 5} = \lim_{x \to 5} \frac{2x}{1} = 10$$

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

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