L'Hôpital's Rule

$$If\ \lim_{x \to c} f(x) = \lim_{x \to c} \frac{P(x)}{Q(x)} \text{ and}$$

$$\left\{\frac{0}{0}, \frac{\infty}{\infty}, 0 \bullet \infty, 1^{\infty}, 0^0, \infty^0, \infty - \infty\right\}, \text{but not } \{0^{\infty}\},$$

$$\text{then } \lim_{x \to c} \frac{P(x)}{Q(x)} = \lim_{x \to c} \frac{P'(x)}{Q'(x)} = \lim_{x \to c} \frac{P''(x)}{Q''(x)} = \cdots$$

***<u>*L'Hôpital's Rule (BC topic, but useful for AB)*</u>

If $\lim_{x \to a} \frac{f(x)}{g(x)}$ is of the form $\frac{0}{0}$ or $\frac{\infty}{\infty}$, and if $\lim_{x \to a} \frac{f'(x)}{g'(x)}$ exists, then $\lim_{x \to a} \frac{f(x)}{g(x)} = \lim_{x \to a} \frac{f'(x)}{g'(x)}$.

L'Hopital's Rule

If $\lim_{x \to a} \frac{f(x)}{g(x)} = \frac{0}{0}$ or $= \frac{\infty}{\infty}$,

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