

Taking the limit of a function with a fraction sometimes ends up with a confusing result like $\frac{\infty}{\infty}$ or $\frac{0}{0}$. Neither of these actually have a real value. L'hôpital's rule is:

$$\lim \frac{f(x)}{g(x)} = \lim \frac{f'(x)}{g'(x)}$$

if and only if $\lim f(x) = \lim g(x)$ and $\lim f(x)$ is either $\pm\infty$ or 0. What this means is if, when taking the limit, you get one of these “indeterminate forms”, you may take the derivative of the top and the bottom **separately** and then re-evaluate the limit. You may do this as many times as you need until you no longer reach an indeterminate form. The limit must exist at ∞ ; that is a requirement for this rule to work.