Please don't confuse these three formulas:

1. Limit of a quotient: $\displaystyle \lim_{x \to a} \frac{f(x)}{g(x)} = \frac{\lim_{x \to a} f(x)}{\lim_{x \to a} g(x)}$ (if the limits exist and that of g is not zero).

2. Derivative of a quotient: $\displaystyle \frac{d}{dx} \frac{f(x)}{g(x)} = \frac{f'(x)g(x) - f(x)g'(x)}{g(x)^2}$.

3. L'Hôpital's rule: $\displaystyle \lim_{x \to a} \frac{f(x)}{g(x)} = \lim_{x \to a} \frac{f'(x)}{g'(x)}$ if the original limit was an indeterminate form of type $\frac{0}{0}$ or $\frac{\infty}{\infty}$ (and the new limit exists).