1 4.8: L'Hospital's Rule

Goal: Given a limit of indeterminate form ($0/0$, ∞/∞, etc.) with differentiable functions, find the limit.

L'Hospital's Rule: If f and g are differentiable and $g'(x) \neq 0$ for all x "near" a, and $\lim_{x\to a} f(x) = \lim_{x\to a} g(x) = 0$ or $\lim_{x\to a} f(x) = \pm\infty$and $\lim_{x\to a} g(x) = \pm\infty$,then

Examples:

Find each of the following limits:

$\lim_{x\to 0} \dfrac{\cos x - 1}{x^2}$

$\lim_{x\to -\infty} xe^x$

Recall the formula for computing compound interest (4.3): $A = P\left(1 + \frac{r}{m}\right)^{mt}$. Find $\lim_{m\to\infty} A$.

On Your Own: Compute $\lim_{x\to 0}(\cos x)^{1/x^2}$.

$e^{-1/2}$