Calculus Study Guide: section 4.7

Verify that L'Hopital's Rule applies and evaluate the limit.

$\lim_{x\to 0^+} \sqrt{x}\ln x$ $0 \cdot -\infty$ rewrite it $\dfrac{\ln x}{\frac{1}{x^{1/2}}} \xrightarrow{LR} \dfrac{\frac{1}{x}}{-\frac{1}{2}x^{-3/2}} = -2x^{1/2}$

$\to 0$

$\lim_{t\to\infty} \dfrac{\ln(e^t+1)}{t}$ $\dfrac{\infty}{\infty}$ $\xrightarrow{LR} \dfrac{\frac{1}{e^t+1}\cdot e^t}{1} = 1$

$\lim_{x\to 1} \dfrac{\sqrt{1-x^2}}{\cos^{-1}x}$ $\dfrac{0}{0}$ $\xrightarrow{LR} \dfrac{\frac{1}{2}(1-x^2)^{-1/2}(-2x)}{-\frac{1}{\sqrt{1-x^2}}} = x = 1$

Which function grows faster, f(x) = x² or g(x) = 2ˣ ?

$\dfrac{x^2}{2^x}$ $\dfrac{\infty}{\infty}$ $\xrightarrow{LR} \dfrac{2x}{2^x \ln 2}$ $\dfrac{\infty}{\infty}$ $\xrightarrow{LR}$

$\dfrac{2}{2^x(\ln 2)^2} \to 0$ $2^x >> x^2$