Math Xb Spring 2004
Worksheet: Logarithmic Differentiation
February 11, 2004

1. Let $f(x) = x^x$.

   (a) Use the definition of the derivative to approximate $f'(2)$ numerically.

   (b) Attempt to find $f'(x)$.

   (c) Use your answer to part (b) to find $f'(2)$ and compare this with your answer to part (a).

2. Find the derivative of each of the following functions.

   (a) $f(x) = x^{\ln x}$

   (b) $f(x) = (\ln x)^x$

(c) $f(x) = 3^x + x^3 + x^{3x}$

3. Use logarithmic differentiation to find the derivative of $f(x) = \dfrac{xe^x}{(x^2+2)^4(5x+2)^2}$.

4. Suppose $y = f(x)g(x)$, where $f(x)$ and $g(x)$ are positive for all x.

   (a) Use logarithmic differentiation to find $\frac{dy}{dx}$.

   (b) Use the Product Rule to find $\frac{dy}{dx}$.

   (c) Do your answers to parts (a) and (b) agree?