Math 106 **Quiz # 6** **28 Feb 08**

Name :_____

Recitation Section :_____

Solve the following problems. Show your work and use correct notation.

1. Let $\sin(xy) = e^{2x}y$. Find dy/dx in terms of x and y.

   Solution.

$$\begin{aligned}
\frac{d}{dx}\sin(x,y) &= \frac{d}{dx}e^{2x}y \\
\cos(xy)(y + x\frac{dy}{dx}) &= 2e^{2x}y + e^{2x}\frac{dy}{dx} \\
\frac{dy}{dx}\left(x\cos(xy) - e^{2x}\right) &= 2ye^{2x} - y\cos(xy) \\
\frac{dy}{dx} &= \frac{2ye^{2x} - y\cos(xy)}{x\cos(xy) - e^{2x}}
\end{aligned}$$

2. Suppose that the differentiable function $y = f(x)$ has an inverse and that the graph of f passes through the point $(3, 10)$ and has a slope of 7 there. Find the value of df^{-1}/dx at $x = 10$.

   Solution.

   Observe that $f(3) = 10$, $f^{-1}(10) = 3$, and $f'(3) = 7$. Then

$$f^{-1}(10) = \frac{1}{f'(f^{-1}(10))} = \frac{1}{f'(3)} = \frac{1}{7}$$