Homework 8

1. Suppose that $f(x, y) = e^{xy}$, $x(u, v) = 3u \sin v$ and $y(u, v) = 4v^2u$, find the $\frac{\partial f}{\partial u}$ and $\frac{\partial f}{\partial v}$.

2. use implicit differentiation to find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$

   (a) $3x^2z + 2z^3 - 3yz = 0$
   (b) $3e^{xyz} - 4xz^2 + x\cos y = 2$

3. Find the directional derivative of $f(x, y) = e^{-(x^2+y^2)}$ at (0 , 0) in the direction of $\mathbf{v} = \mathbf{i} + \mathbf{j}$

4. Find the directional derivative of $f(x, y) = e^y \sin x$ at (0 , 0) in the direction from P(0 , 0) to Q(2 , 1)