Calculus III
Homework on Lecture 9

1. Compute the indicated partial derivatives. Answer key has not been proofread, use with caution.

   (a) $\frac{\partial r}{\partial x}$, $\frac{\partial r}{\partial y}$, $r = \sqrt{x^2 + y^2}$.

   (b) $\frac{\partial^2 r}{\partial x^2}$, $\frac{\partial^2 r}{\partial y^2}$, $\frac{\partial^2 r}{\partial y \partial x}$, $r = \sqrt{x^2 + y^2}$.

   (c) $\frac{\partial \theta}{\partial x}$, $\frac{\partial \theta}{\partial y}$, $\theta = \arctan\left(\frac{y}{x}\right)$.

   (d) $\frac{\partial^2 \theta}{\partial x^2}$, $\frac{\partial \theta^2}{\partial y \partial x}$, $\frac{\partial^2 \theta}{\partial y^2}$, $\theta = \arctan\left(\frac{y}{x}\right)$.