(1) (5 points) Find the first order partial derivatives of the following function

\[ f(x, y, z) = \frac{1}{\sqrt{x^2 + y^2 + z^2}} \]
(2) (5 points) Find the second order partial derivatives $u_{xx}$, $u_{xy}$, $u_{yx}$, $u_{yy}$ of the following function

$$u = \ln \left( x^2 + y^2 \right)$$

and show that it satisfies the Laplace equation $u_{xx} + u_{yy} = 0$. 
(3) (5 points) Compute \( \partial z/\partial x \) and \( \partial z/\partial y \) if

\[
z = \frac{u^2 + v^2}{u^2 - v^2}, \quad u = e^{x-y}, \quad v = e^{xy}.
\]