Q1. Find the derivative of \( f(x, y, z) = \sqrt[3]{xy} \) at \( P(-3, -3, 4) \) in the direction of \( \vec{u} = \langle 3, 1, -4 \rangle \).

Q2. Let \( 2^x + \tan^{-1}(y + z) = 2 \). Find \( \frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} \) at \( (1, -1, 1) \).
Q3. If \( z = \tan^{-1}\left( \frac{u^2}{v} \right) \) where \( u = x + y \) and \( v = 2x - y \), then find \( \frac{\partial z}{\partial x} \) at \((x,y) = (2,2)\).

Q4. Find the direction in which the function \( f(x, y, z) = \ln(x^2 + y^2 - 1) - 2y + 2xe^z \) increases most rapidly at the point \( P(1,1,0) \).