Instructions: Show Your Work!

1. (3 pts) Use the Chain rule to find $\partial z/\partial s$ and $\partial z/\partial t$ for $z = \tan(u/v)$, $u = s + t$, $v = s - t$

2. (3 pts) Find $\partial z/\partial x$ and $\partial z/\partial y$ at the point $(0, 1, 1)$ if $x^3 + 2y^3 + z^3 - \cos(xyz) = 2$

3. (4 pts) Find all points at which the direction of the fastest increase of the function $f(x, y) = x^2 + y^2 - 2x - 4y$ is $(1, 1)$. 
1. (3 pts) Use the Chain rule to find $\partial z/\partial s$ and $\partial z/\partial t$ for
   \[ z = \tan\left(\frac{u}{v}\right), \quad u = 2s + 3t, \quad v = 3s - 2t \]

2. (3 pts) Find $\partial z/\partial x$ and $\partial z/\partial y$ at the point (1,0,1) if
   \[ x^3 + 2y^3 + z^3 - \cos(xyz) = 1 \]

3. (4 pts) Find all points at which the direction of the fastest increase of the function
   \[ f(x, y) = x^2 + y^2 - 2x - 4y \]
   is (1, 2).