Math 208 Quiz 3

Name:_____ Score:_____

Instructions: You must show supporting work to receive full and partial credits. No text book, notes, formula sheets allowed.

1. (*4*) Find the directional derivative of $z = f(x, y) = x^2 y$ at $(-2, 1)$ in the direction towards the point $(1, 1)$.

2. (*4*) If $f_x(2, 1) = -1, f_y(2, 1) = 2$, find the direction at which the value of f decreases the most rapidly at $(2, 1)$ and the maximal rate of decrease.

3. (*4*) It is given that y can be solved as a function of x, z from the equation $yz - xz^2 + 2ye^{xy} = 4$ at the point $(-1, 0, 2)$. Use implicit differentiation to find $\frac{\partial y}{\partial z}(-1, 2)$ at the point.

4. (*4*) Find an equation of the tangent plane to the surface $z = \frac{xy-1}{y-x}$ at the point $(1, 2, 1)$.

5. (*4*) Find a set of parametric equations of the line normal to the surface $z = \frac{xy-1}{y-x}$ at the point $(1, 2, 1)$.

END