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*) If $f_x(1,0) = -2, f_y(1,0) = 1$, find the unit direction at which f increases most rapidly at $(1,0)$ and the maximal rate.

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

3. (*4*) Verify that $(1,1,2)$ is on the level surface $xy + xz - yz = 1$. Find an equation of the tangent plane to the surface at the point.

4. (*4*) Find the directional derivative of $f(x,y) = xy^2$ at $(1,2)$ in the direction towards $(2,0)$.

5. (*4*) Find all critical points of $f(x,y) = x^2 + xy^2 - 2y^2 - 6x$.

END