Name: MATH 241 §004

Quiz 4: §14.1-14.5

Complete the following problems to the best of your ability. **SHOW ALL OF YOUR WORK.** Unshown work will not be graded. You may not use a calculator.

1. Does the limit $\lim_{(x,y)->(0,0)} \frac{x+xy}{\sqrt{x^2+y^2}}$ exist? Support your answer with a rigorous argument.

2. Let $f(x,y) = xy^2 + 2x^2 - y^3$

   (a) Calculate the partial derivatives f_x and f_y.

   (b) Calculate the directional derivative of f in the direction of $\mathbf{v} = \langle 2, -3 \rangle$ at the point $P = (1, 0)$.

3. Suppose $z = x^2y + \ln(x)$ where $x = \sin(t) + st^2$ and $y = e^{st}$. Calculate $\partial z/\partial t$ (in terms of x, y, s and t).