

Math 324 Quiz 3

February 23, 2017

Problem 1. Calculate the gradient of

$$f(x, y) = ye^{-xy}.$$

Problem 2. The gradient of the function $f(x, y)$ from the previous problem is $\langle -4, 1 \rangle$ at the point $(0, 2)$. Determine in which directions the directional derivative $f(x, y)$ at this point has the value 1. Remember: directions are unit vectors!

Problem 3. Let $f(x, y)$ and $g(x, y)$ be differentiable functions of x, y , with $g(x, y) \neq 0$. Show that the gradient satisfies a “quotient rule”:

$$\nabla \left(\frac{f}{g} \right) = \frac{1}{g^2} (g \nabla f - f \nabla g).$$