

Score: _____

Name: _____

Worksheet 3 - Section 14.1, 14.3, 14.4 (Due Tues, Sept 30)

Math 2110Q – Fall 2014

Professor Hohn

You must show all of your work to receive full credit!

1. Sketch both a contour map and the graph of the function

$$f(x, y) = x^2 + 9y^2.$$

Pick at least 5 k values for your contour map.

2. The temperature at a point (x, y) on a flat metal plate is given by $T(x, y) = 60/(1 + x^2 + y^2)$, where t is measured in $^{\circ}\text{C}$ and x, y in meters. Find the rate of change of temperature with respect to distance at the point $(2, 1)$ in (a) the x -direction and (b) the y -direction.

3. Let $z = \ln(e^x + e^y)$.

(a) Verify that the function is a solution of the differential equation

$$\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = 1.$$

(b) Verify that the function is a solution of the differential equation

$$\frac{\partial^2 z}{\partial x^2} \frac{\partial^2 z}{\partial y^2} - \left(\frac{\partial^2 z}{\partial x \partial y} \right)^2 = 0.$$

4. Find an equation of the tangent plane to the surface $z = \ln(x - 2y)$ at the point $(3, 1, 0)$.