MATH 202
Quiz 5

Name :_____

March 4, 2008

Instructions: This quiz is worth five points. You get one point for taking this quiz.

1. (1 pt.) Consider the function of two variables

$$f(x,y) = \ln(x+2y)$$

Compute $f_y(x,y)$ and $f_{yx}(x,y)$.

$f_y(x,y) = \frac{\partial \ln(x+2y)}{\partial y} = \frac{1}{x+2y} \frac{\partial (x+2y)}{\partial y} = \frac{2}{x+2y}$

$f_{yx}(x,y) = \left(\frac{\partial}{\partial x}\right)\left(\frac{2}{x+2y}\right) = -2(x+2y)^{-2} \cdot \frac{\partial (x+2y)}{\partial x} = -\frac{2}{(x+2y)^2}$

2. (1 pt.) Consider the function $T(x,y)$ that measures temperature in degrees Celsius at a location given by coordinates (x,y) in the plane. Here x and y are measured in meters.

Suppose at a point $(2,3)$ that

- $T(2,3) = 0$ °C
- $\frac{\partial T(2,3)}{\partial y} = -2$.

Is the temperature at $(2, 2.99)$ likely to be above or below freezing? Explain briefly.

The temperature should be above freezing.

$\frac{T(2,2.99) - T(2,3)}{2.99 - 3} \approx \frac{\partial T(2,3)}{\partial y} = -2$. So, $T(2,2.99) \approx 0.02 > 0$

3. (2 pts.) Find the equation of the tangent plane to the surface $f(x,y) = 3x^2 - x + 2y$ at the point $P(-1,-1,2)$

$z - z_0 = f_x(x_0,y_0)(x-x_0) + f_y(x_0,y_0)(y-y_0)$

$f_x(x,y) = 6x - 1$

$f_y(x,y) = 2$

$z - 2 = (6(-1) - 1)(x - (-1)) + 2(y - (-1))$

$z - 2 = -7(x+1) + 2(x+1)$

$z = -7x + 2y - 3$