Math 1451, Honor Calculus Practice 6, Spring 2016.

February 19, 2016

PSID: _____ Name: _____

1. Given a surface $z = 3(x-1)^2 + 2(y+3)^2 + 7$ and a point $(2, -2, 12)$. Find an equation of the tangent plane to the given surface at specified point.

2. Given $f(x, y) = \sqrt{x + e^{4y}}$ and a point $(3, 0)$. Explain why the function is differentiable at the given point. Then find the linearization $L(x, y)$ of the function at that point.

3. Given $f(x, y, z) = xe^{2yz}$, a point $P(3, 0, 2)$, and a vector $\mathbf{u} = \left\langle \frac{2}{3}, -\frac{2}{3}, \frac{1}{3} \right\rangle$. Then

   (a) Find the gradient of f.

   (b) Evaluate the gradient at the point P.

   (c) Find the rate of change of f at P in the direction of the vector $\mathbf{u}$.