Due With Homework 6 — Math 264

September 23, 2009

Please do these on a separate sheet of paper.

1. Let find the 2nd order Taylor Approximations centered at $(0, 0)$ for the following functions
   (a) $f(x, y) = e^{xy}$.
   (b) $f(x, y) = \sin(x) + 2y$.

2. Consider the functions $u(x, y) = x^2 - y^2 + 2x$ and $v(x, y) = 2xy + y$.
   (a) Plot the level sets of $u(x, y)$ and $v(x, y)$.
   (b) Prove that any two level sets of $u(x, y)$ and $v(x, y)$ intersect transversely. That is, for *every* A and *every* B the sets defined by $u(x, y) = A$ and $v(x, y) = B$ meet perpendicularly.

3. Find an equation for the plane tangent to the ellipsoid
$$\frac{x^2}{4} + \frac{y^2}{9} + z^2 = 1$$
   are the point $(x_0, y_0, z_0) = (\sqrt{2}, \sqrt{3}, 1/\sqrt{6})$.