ESP Quiz 3 (Kouba)

Please PRINT your name here: -------------------------------------------------------------

This quiz is due next Tuesday at the beginning of ESP class.

1.) (15 pts.) Find and classify the critical points for \( z = 4xy - x^4 - y^4 \).

2.) (15 pts.) Show that \( z = \ln(1 + x^2 + y^2) \) satisfies the equation \( z_{xy} + z_{x}z_{y} = 0 \).
3.) (15 pts.) Determine a function $z$ whose partial derivatives are $z_x = e^{y^2} - y \sin(xy) + 3x^2$ and $z_y = 2xye^{y^2} - x \sin(xy) + \sec^2 y$, or conclude that this is impossible.

4.) (15 pts.) Find the point $(x, y, z)$ on the plane $x + 2y + 3z = 6$ which is nearest the origin.