Math 128

Worksheet 1 – September 3, 2008

Name _____

1. In class, we worked out the geometric meaning of $\dfrac{\partial}{\partial x} x^2 - y^2$ at the point $(1, 2, -3)$. (I.e., at $x = 1$, $y = 2$.)

   This problem will work out the geometric meaning of $\dfrac{\partial}{\partial y} x^2 - y^2$.

   (a) Find $\dfrac{\partial}{\partial y} x^2 - y^2$ at $x = 1$.

   (b) What cross-section of the graph of the function does setting $x = 1$ correspond to? Graph this cross-section.

   (c) On your 2D graph from part (b), find the point corresponding to $(1, 2, -3)$ on the full 3D graph of $z = x^2 - y^2$.

(d) Find the equation (of the form $z = my + b$) for the tangent line to the $x = 1$ cross section at the point you found in (c).

(e) In your graph of the $x = 1$ cross section, draw the tangent line that you found in part (d).

2. Go through similar steps to find the tangent lines to $x^2 - y^2$ at the point $(0, 0, 0)$ in the xz-plane $(y = 0)$; and in the yz-plane $(x = 0)$.