WRITTEN HOMEWORK #1, DUE JAN 13, 2010

You may turn this assignment into the homework boxes outside the classroom (Kemeny 008) or at the beginning of class. Remember that you need to provide correct details to receive full credit.

(1) (Chapter 13.4, #49) Let $\mathbf{a} \neq \mathbf{0}$ be any nonzero vector in $\mathbb{R}^3$, and let $\mathbf{b}, \mathbf{c}$ be two vectors in $\mathbb{R}^3$. Are each of the following statements true or false? Provide reasons for your answers.
   (a) If $\mathbf{a} \cdot \mathbf{b} = \mathbf{a} \cdot \mathbf{c}$, is it necessarily true that $\mathbf{b} = \mathbf{c}$?
   (b) If $\mathbf{a} \times \mathbf{b} = \mathbf{a} \times \mathbf{c}$, is it necessarily true that $\mathbf{b} = \mathbf{c}$?
   (c) If $\mathbf{a} \cdot \mathbf{b} = \mathbf{a} \cdot \mathbf{c}$ and $\mathbf{a} \times \mathbf{b} = \mathbf{a} \times \mathbf{c}$, is it necessarily true that $\mathbf{b} = \mathbf{c}$?

(2) (Chapter 13.5, #62) (a) Find the point of intersection of the two lines

$$\langle 1, 1, 0 \rangle + t\langle 1, -1, 2 \rangle$$
$$\langle 2, 0, 2 \rangle + s\langle -1, 1, 0 \rangle$$

   (b) Find an equation for the plane which contains both these lines.

(3) Sketch a graph of $\mathbf{r}(t) = \langle \cos t, \sin t, t \rangle$, where $0 \leq t \leq 2\pi$. What is the arclength of this curve?

(4) (Chapter 15.3, #94) If $f(x, y) = \sqrt[3]{x^3 + y^3}$, find $f_x(0, 0)$.