HOMEWORK 1, MATH 175 - FALL 2010

DUE FRIDAY SEPTEMBER 3RD

This homework assignment covers Sections 13.1 - 13.4 in the book.

1. Find an equation of the sphere which intersects the origin and whose center is $(1, -1, 3)$.

2. Find an equation describing all the points which are equidistant from the points $(1, 1, 1)$ and $(-1, -1, -1)$, describe this set.

3. Find the unit vectors that are parallel to the tangent line to the parabola $y = x^2$ at the point $(2, 4)$.

4. Find the orthogonal projection of the vector $\mathbf{v} = (2, -1, 3)$ in the direction of the vector $\mathbf{w} = (2, 1, 1)$.

5. If $\mathbf{r} = (x, y, z)$, $\mathbf{a} = (2, 1, -1)$, and $\mathbf{b} = (1, 1, 0)$ then show that the equation $(\mathbf{r} - \mathbf{a}) \cdot (\mathbf{r} - \mathbf{b}) = 0$ describes a sphere and find it's center and radius.

6. Find all vectors $\mathbf{v} = (v_1, v_2, v_3)$ such that $\mathbf{i} \times (\mathbf{j} \times \mathbf{v}) = (\mathbf{i} \times \mathbf{j}) \times \mathbf{v}$.

7. Find all vectors $\mathbf{v} = (v_1, v_2, v_3)$ such that $\mathbf{i} \cdot (\mathbf{j} \times \mathbf{v}) = (\mathbf{i} \times \mathbf{j}) \cdot \mathbf{v}$.