Math 2551 Worksheet Section 12.3

1. Let $\vec{v} = \langle 2, -4, \sqrt{5} \rangle$ and $\vec{u} = \langle -2, 4, -\sqrt{5} \rangle$. Compute the following:
   (a) $\vec{v} \cdot \vec{u}$
   (b) the cosine of the angle between $\vec{v}$ and $\vec{u}$.
   (c) $\text{proj}_{\mathbf{v}} \mathbf{u}$.
   (d) $(3\vec{v}) \cdot (2\vec{u})$.
2. Are $\vec{u} = 3\hat{i} - 2\hat{j}$ and $\vec{v} = 4\hat{i} + 6\hat{j}$ orthogonal? Why or why not? Also, sketch these vectors.
3. Suppose that a box on a horizontal floor is being towed at an angle of 30° to the right with a force $\vec{F}$ of magnitude 22 newtons.
   (a) Draw a diagram.
   (b) What is the horizontal and vertical components of the force?
   (c) How much work is done by the force $\vec{F}$ if the box is pulled 7 meters?