Written Homework 13

Math 126

Solve each of the following problems. Write your solutions clearly and neatly on separate paper, explaining your reasoning with complete sentences. Submit your work either in class or in the homework mailbox (RMS level 3, near the fireplace) by 4:00pm on **Wednesday, November 13**.

1. Determine whether each statement is true or false. If it is true, explain why. If it is false, explain why or give an example that disproves the statement.

(a) For any vectors $\mathbf{u}$ and $\mathbf{v}$ in $\mathbb{R}^3$, $\mathbf{u} \times \mathbf{v} = \mathbf{v} \times \mathbf{u}$.

(b) For any vectors $\mathbf{u}$ and $\mathbf{v}$ in $\mathbb{R}^3$, $|\mathbf{u} \times \mathbf{v}| = |\mathbf{v} \times \mathbf{u}|$.

(c) For any vectors $\mathbf{u}$ and $\mathbf{v}$ in $\mathbb{R}^3$, $(\mathbf{u} \times \mathbf{v}) \cdot \mathbf{u} = 0$.

2. Find the value(s) of x such that the vectors $\langle 3, 2, x \rangle$ and $\langle 2x, 4, x \rangle$ are orthogonal.

3. Find two unit vectors that are orthogonal to both $\mathbf{j} + 2\mathbf{k}$ and $\mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$.

4. If $\mathbf{a} = \langle 3, 0, 4 \rangle$, find a vector $\mathbf{b}$ such that $\text{comp}_{\mathbf{a}}\mathbf{b} = 2$.