Physics 121H

Vector Review

For the following problems, use these vectors: \( \vec{a} = 3\hat{i} + 4\hat{j} \), \( \vec{b} = 5\hat{i} - 2\hat{j} \) & \( \vec{c} = \hat{i} - \hat{j} \)

1. Find the sum and difference of all of these vectors. Show that vector addition is commutative.

2. Find the length of all of these vectors and the lengths of the sum and differences of all of these vectors.

3. Find the angle that each of these vectors make with the positive x-axis.

4. Find \( \vec{a} \cdot \vec{b}, \vec{a} \cdot \vec{c}, \vec{b} \cdot \vec{c}, \vec{c} \cdot \vec{a} \) & \( \vec{c} \cdot \vec{b} \).

5. Find \( \vec{a} \times \vec{b}, \vec{a} \times \vec{c}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a} \) & \( \vec{c} \times \vec{b} \).

6. For the vector \( \vec{g} = g_x\hat{i} + g_y\hat{j} \), find the angle that the vector makes with the positive x-axis. Find the length of \( \vec{g} \) and show that \( g = \sqrt{\vec{g} \cdot \vec{g}} \). Find the x and y components of \( \vec{g} \) in terms of its length and the angle \( \vec{g} \) makes with the positive x-axis.