

Each problem is worth 5 points. Clear and complete justification is required for full credit.

1. Suppose  $\mathbf{a} = 3\mathbf{i} - 4\mathbf{k}$  and  $\mathbf{b} = 4\mathbf{i} - \mathbf{j} + 2\mathbf{k}$ . Find  $\mathbf{a} + \mathbf{b}$  and  $3\mathbf{a} - \mathbf{b}$ .

$$3\mathbf{i} + 0\mathbf{j} - 4\mathbf{k}$$

$$+ \quad 4\mathbf{i} - 1\mathbf{j} + 2\mathbf{k}$$

$$\boxed{7\mathbf{i} - \mathbf{j} - 2\mathbf{k}}$$

$$9\mathbf{i} + 0\mathbf{j} - 12\mathbf{k}$$

$$- \quad 4\mathbf{i} - \mathbf{j} + 2\mathbf{k}$$

$$\boxed{5\mathbf{i} + \mathbf{j} - 14\mathbf{k}}$$

Good!

2. Find a unit vector in the direction of  $\mathbf{v} = \langle 2, -4, 4 \rangle$ .

$$\vec{v} = \langle 2, -4, 4 \rangle$$

$$|\vec{v}| = \sqrt{(2)^2 + (-4)^2 + 4^2}$$

$$= \sqrt{4 + 16 + 16}$$

$$= \sqrt{36} = 6$$

$$\vec{u} = \frac{1}{6} \langle 2, -4, 4 \rangle$$

$$= \left\langle \frac{2}{6}, \frac{-4}{6}, \frac{4}{6} \right\rangle$$

$$= \left\langle \frac{1}{3}, \frac{-2}{3}, \frac{2}{3} \right\rangle$$

Great!