

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 $\mathbf{b} = 5\mathbf{i} - \mathbf{j} + 2\mathbf{k}$. Find $\mathbf{a} + 2\mathbf{b}$ and $3\mathbf{a} - \mathbf{b}$.

$$a + 2b \quad a = \langle 3, 0, -4 \rangle \quad b = \langle 5, -1, 2 \rangle$$

$$a + 2b = \langle 3, 0, -4 \rangle + 2\langle 5, -1, 2 \rangle$$

$$a + 2b = \langle 3, 0, -4 \rangle + \langle 10, -2, 4 \rangle$$

$$a + 2b = \underline{\langle 13, -2, 0 \rangle} \quad \text{Great}$$

$$3a - b = 3\langle 3, 0, -4 \rangle - \langle 5, -1, 2 \rangle$$

$$3a - b = \langle 9, 0, -12 \rangle - \langle 5, -1, 2 \rangle$$

$$3a - b = \underline{\langle 4, 1, -14 \rangle}$$

2. Find the magnitude of the vector $\langle -8, 6 \rangle$.

$$5 \quad |a| = \sqrt{(-8)^2 + (6)^2} = \sqrt{64 + 36} = \sqrt{100} = \underline{10}$$

Good

3. Find a unit vector in the direction of $\mathbf{v} = \langle 6, -3, 2 \rangle$.

$$\vec{v} = \langle 6, -3, 2 \rangle$$

Great

$$5 \quad \frac{\vec{v}}{|\vec{v}|} = \frac{\langle 6, -3, 2 \rangle}{\sqrt{6^2 + (-3)^2 + 2^2}} = \frac{\langle 6, -3, 2 \rangle}{\sqrt{36 + 9 + 4}} = \frac{\langle 6, -3, 2 \rangle}{\sqrt{49}}$$

$$= \underline{\left\langle \frac{6}{7}, -\frac{3}{7}, \frac{2}{7} \right\rangle}$$