

Exercise 1. Consider the vectors $\vec{u} = \langle 1, 3, 4 \rangle$ and $\vec{v} = -2\hat{j} + 3\hat{k}$. Examine the following attempt to evaluate $3\vec{v} + 2\vec{u}$:

$$3\vec{v} + 2\vec{u} = 3\langle 1, 3, 4 \rangle + 2(-2\hat{j} + 3\hat{k}) \quad (1)$$

$$= (3 + 9 + 4) + 2(-2\hat{j} + 3\hat{k}) \quad (2)$$

$$= 16 + 2(-2\hat{j} + 3\hat{k}) \quad (3)$$

$$= 18(-2\hat{j} + 3\hat{k}) \quad (4)$$

$$= (-16\hat{j} + 21\hat{k}) \quad (5)$$

$$= \langle -16, 0, 21 \rangle \quad (6)$$

In the following space complete the tasks below:

- Answer: should the result of this operation be a vector or a scalar?
- Identify at least 3 mistakes in the process. Refer to the equation numbers where errors occur.

Exercise 2. Consider the following pairs of vectors:

$$\hat{i} + \sqrt{3}\hat{j} \quad \text{and} \quad \sqrt{3}\hat{i} + 3\hat{j} \quad (1)$$

$$2\hat{i} + 4\hat{j} + 6\hat{k} \quad \text{and} \quad 4\hat{i} + 6\hat{j} + 8\hat{k} \quad (2)$$

$$\hat{i} - \sqrt{3}\hat{j} + \hat{k} \quad \text{and} \quad -3\hat{i} + 3\hat{k} \quad (3)$$

In the following space complete the tasks below:

- Define parallel and orthogonal vectors.
- Identify which pair is parallel, which is orthogonal, and which is neither.