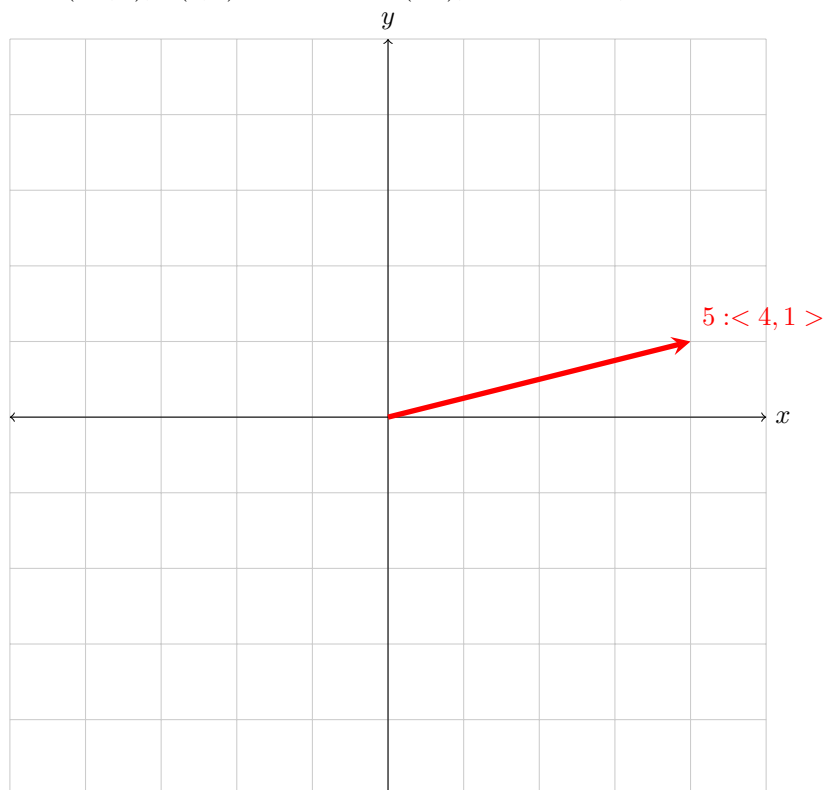


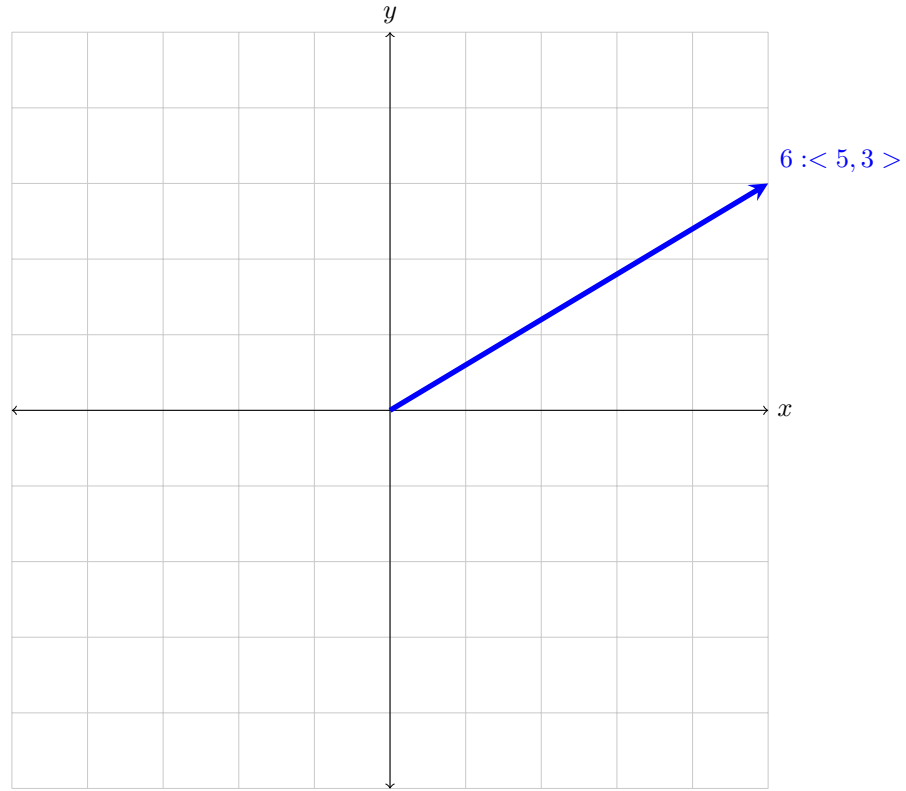
Find a vector  $\mathbf{a}$  with representation given by the directed line segment  $\overrightarrow{AB}$ .

Draw  $\overrightarrow{AB}$

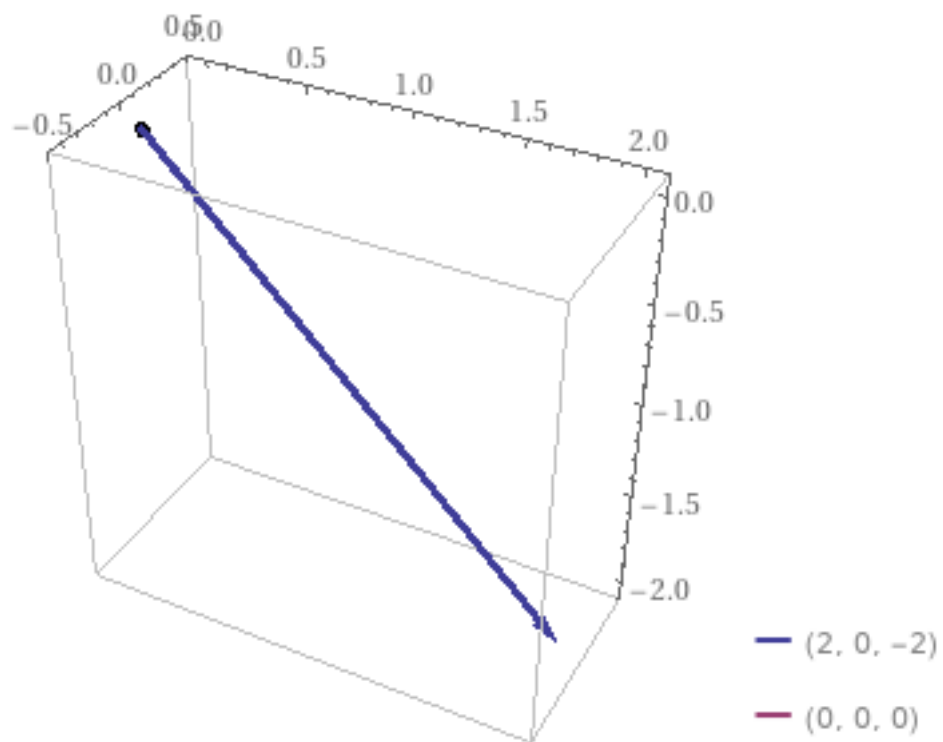
$$5 : A(-1, 1), B(3, 2) : \overrightarrow{AB} = \langle 3 - (-1), 2 - 1 \rangle = \langle 4, 1 \rangle$$



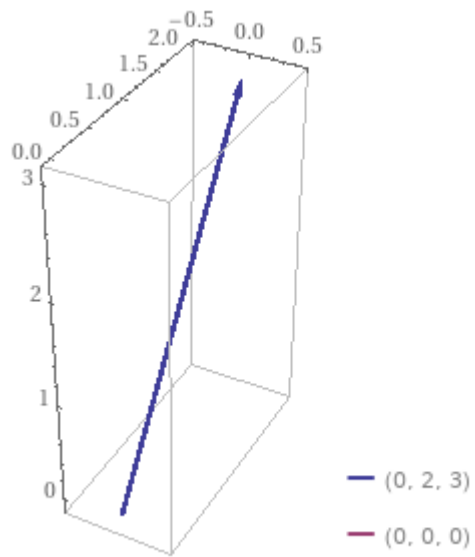
$$6 : A(-4, -1), B(1, 2) : AB = \langle 1 - (-4), 2 - (-1) \rangle = \langle 5, 3 \rangle$$



$$7 : A(0, 3, 1), B(2, 3, -1) : AB = \langle 2 - 0, 3 - 3, (-1) - 1 \rangle = \langle 2, 0, -2 \rangle$$



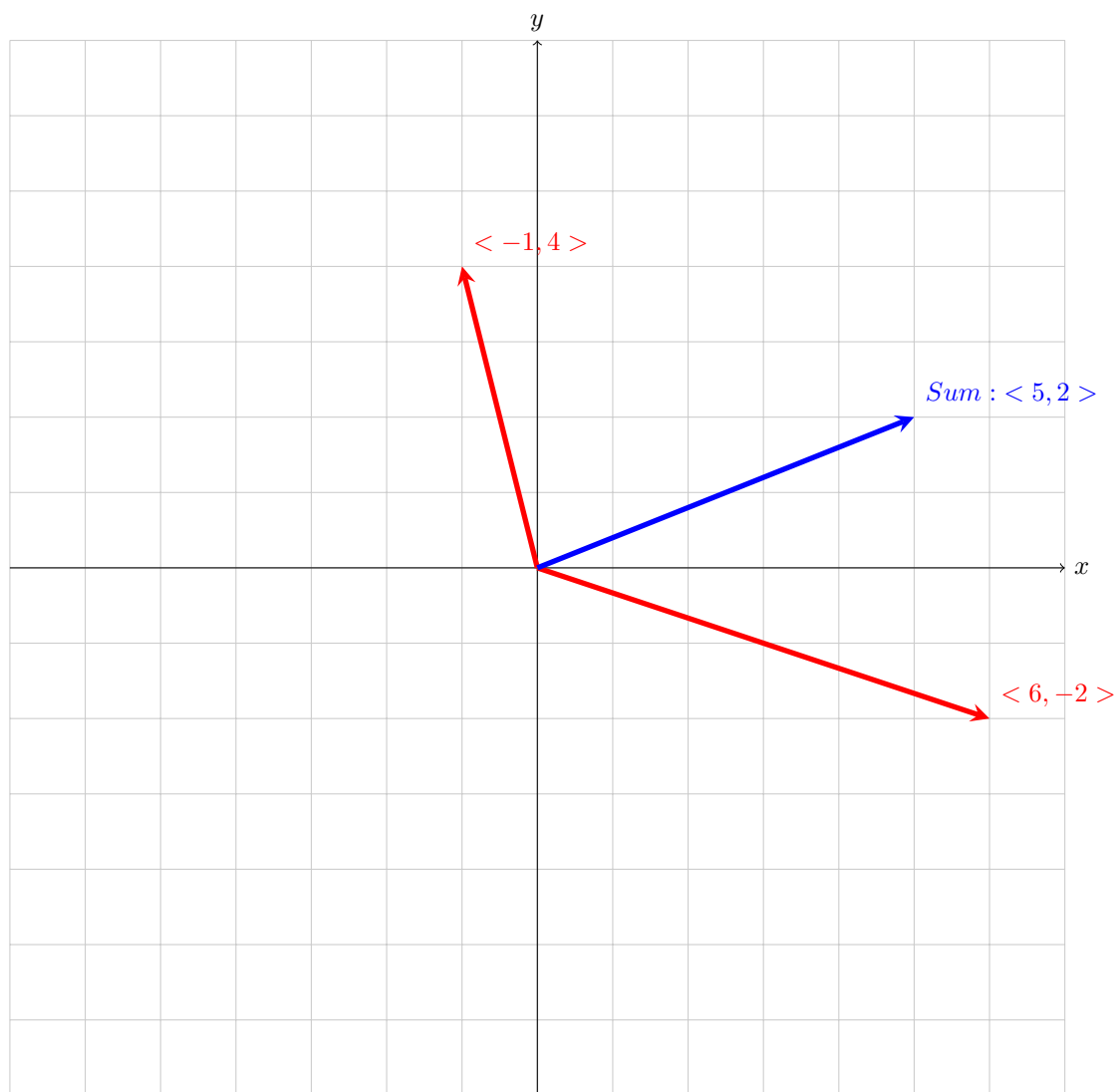
$$8 : A(4, 0, -2), B(4, 2, 1) : AB = \langle 4 - 4, 2 - 0, 1 - (-2) \rangle = \langle 0, 2, 3 \rangle$$



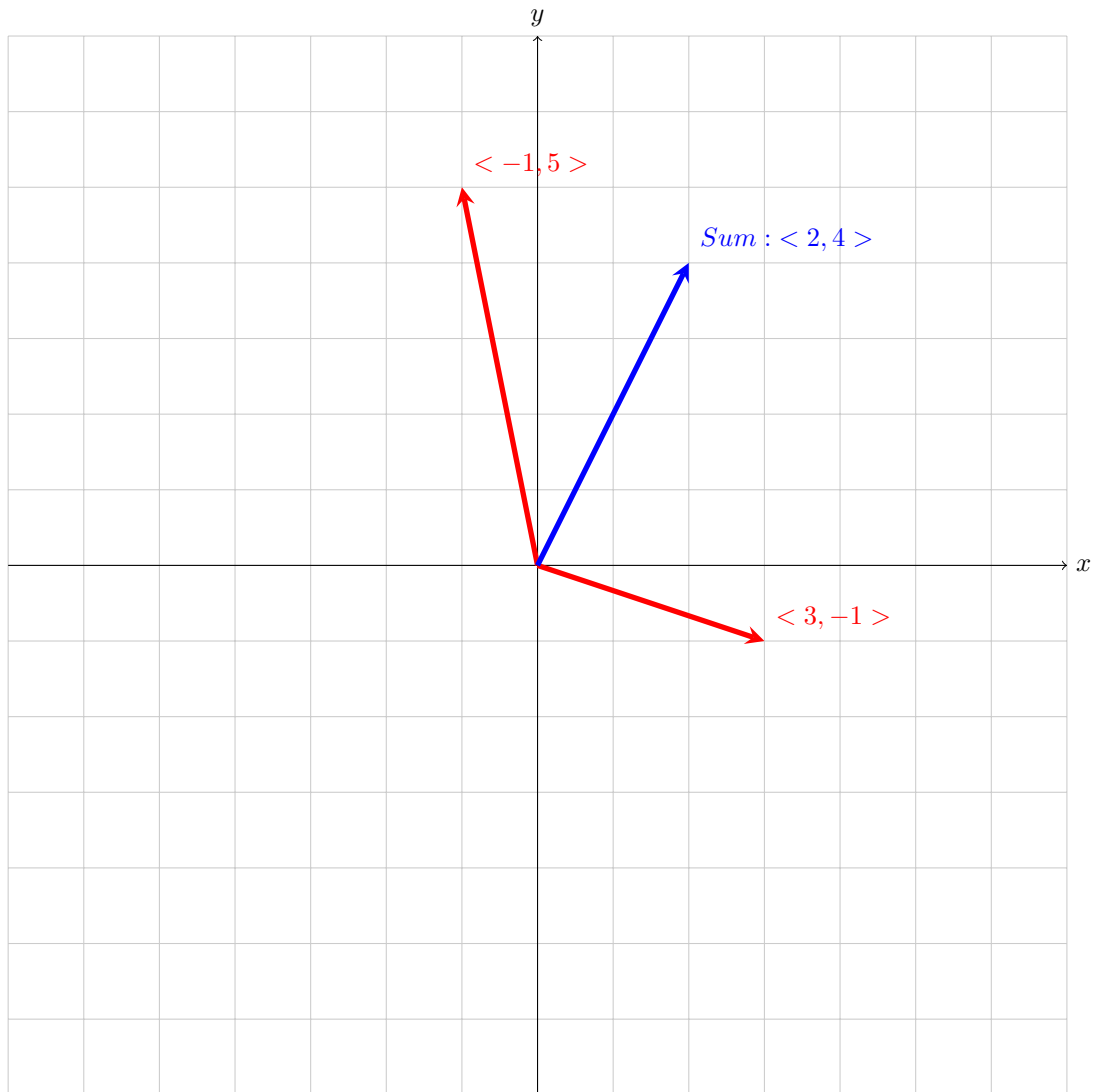
# Calculus III Homework 3 Question 3

## Section 10.2 # 9 - 12

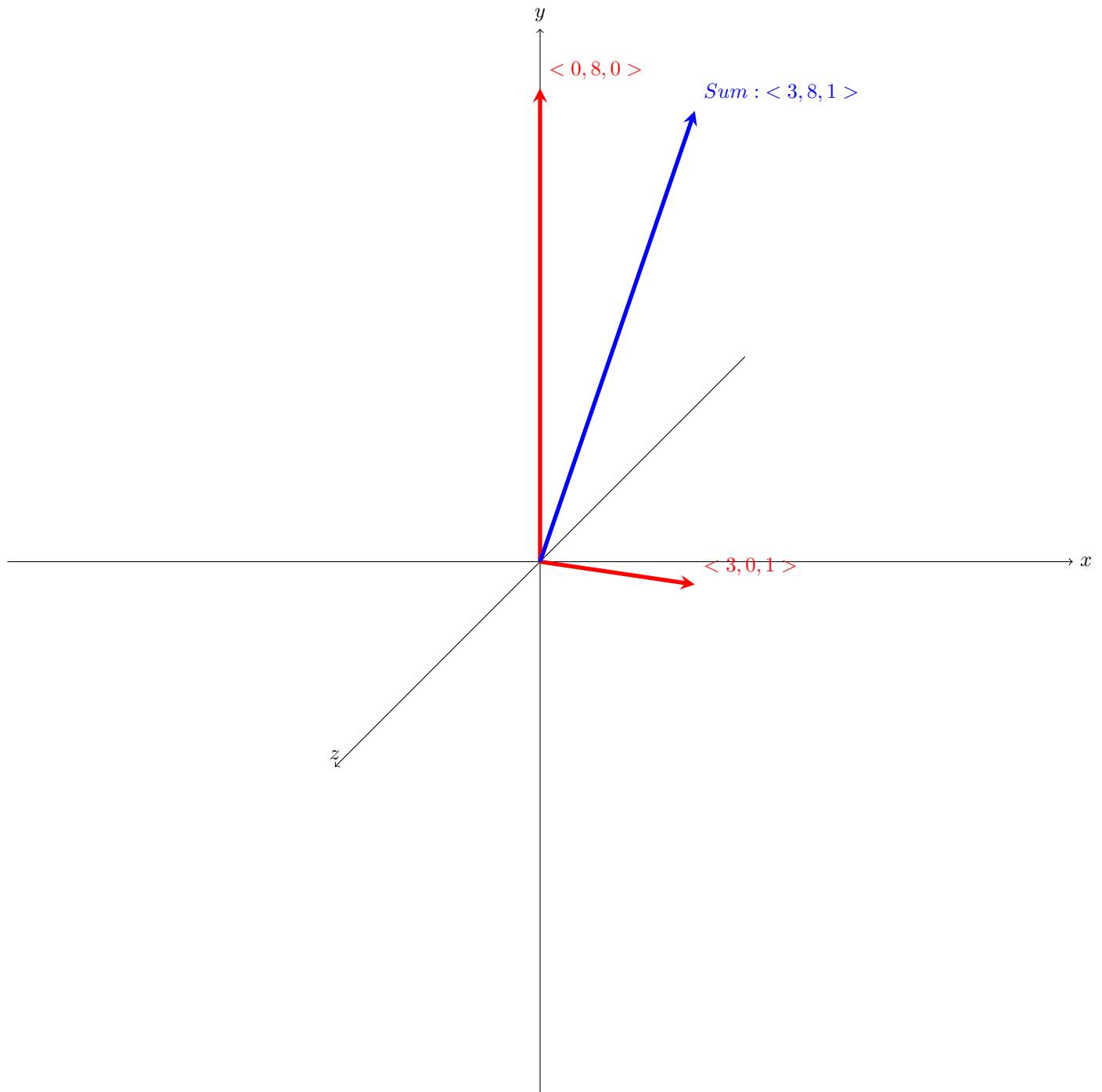
9. Find the sum of  $\langle -1, 4 \rangle$  and  $\langle 6, -2 \rangle$  and graph them



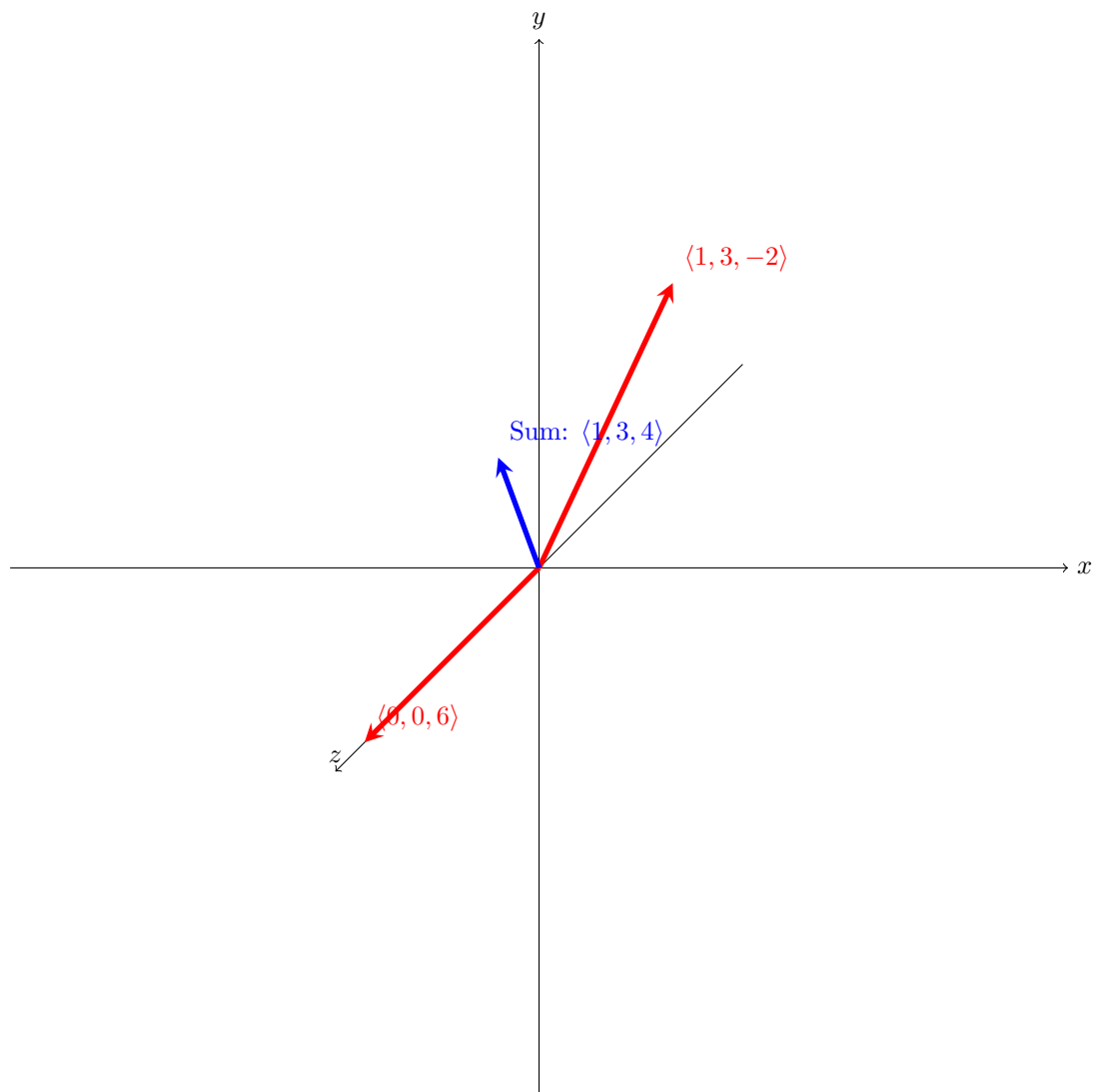
10. Find the sum of  $\langle 3, -1 \rangle$  and  $\langle -1, 5 \rangle$  and graph them



11. Find the sum of  $\langle 3, 0, 1 \rangle$  and  $\langle 0, 8, 0 \rangle$  and graph them



12. Find the sum of  $\langle 1, 3, -2 \rangle$  and  $\langle 1, 3, 4 \rangle$  and graph them





# Math215

## Homework 3

September 29, 2021

### Problem 8

Show that  $\vec{A} \cdot (\vec{A} \times \vec{B}) = \vec{0}$  and  $\vec{B} \cdot (\vec{A} \times \vec{B}) = \vec{0}$  for all  $\vec{A} = \langle a_1, a_2, a_3 \rangle$  and  $\vec{B} = \langle b_1, b_2, b_3 \rangle$

**Proof:**

$$\vec{A} \cdot (\vec{A} \times \vec{B}) = \quad (1)$$

$$\langle a_1, a_2, a_3 \rangle \cdot (\langle a_1, a_2, a_3 \rangle \times \langle b_1, b_2, b_3 \rangle) = \quad (2)$$

$$\langle a_1, a_2, a_3 \rangle \cdot (\langle a_2b_3 - a_3b_2, a_3b_1 - a_1b_3, a_1b_2 - a_2b_1 \rangle) = \quad (3)$$

$$a_1(a_2b_3 - a_3b_2) + a_2(a_3b_1 - a_1b_3) + a_3(a_1b_2 - a_2b_1) = \quad (4)$$

$$a_1a_2b_3 - a_1a_3b_2 + a_2a_3b_1 - a_2a_1b_3 + a_3a_1b_2 - a_3a_2b_1 = \quad (5)$$

$$a_1a_2b_3 - a_1a_2b_3 + a_2a_3b_1 - a_2a_3b_1 + a_1a_3b_2 - a_1a_3b_2 = \quad (6)$$

$$0 \quad (7)$$

$$\vec{B} \cdot (\vec{A} \times \vec{B}) = \quad (8)$$

$$\langle b_1, b_2, b_3 \rangle \cdot (\langle a_1, a_2, a_3 \rangle \times \langle b_1, b_2, b_3 \rangle) = \quad (9)$$

$$\langle b_1, b_2, b_3 \rangle \cdot (\langle a_2b_3 - a_3b_2, a_3b_1 - a_1b_3, a_1b_2 - a_2b_1 \rangle) = \quad (10)$$

$$b_1(a_2b_3 - a_3b_2) + b_2(a_3b_1 - a_1b_3) + b_3(a_1b_2 - a_2b_1) = \quad (11)$$

$$b_1a_2b_3 - b_1a_3b_2 + b_2a_3b_1 - b_2a_1b_3 + b_3a_1b_2 - b_3a_2b_1 = \quad (12)$$

$$b_1a_2b_3 - b_1a_2b_3 + b_2a_3b_1 - b_2a_3b_1 + b_3a_1b_2 - b_3a_1b_2 = \quad (13)$$

$$0 \quad (14)$$