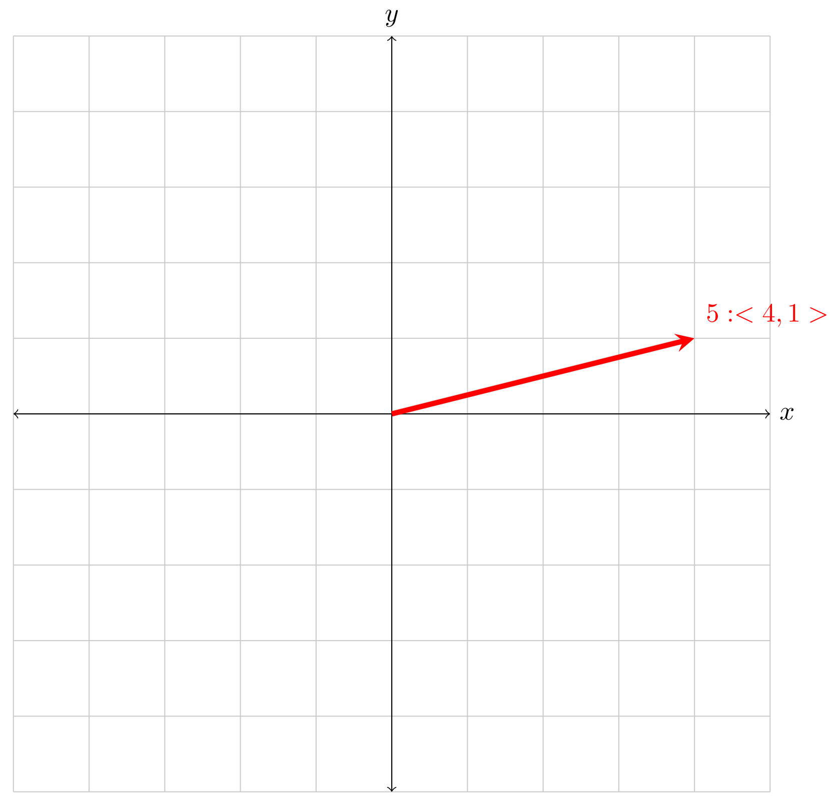
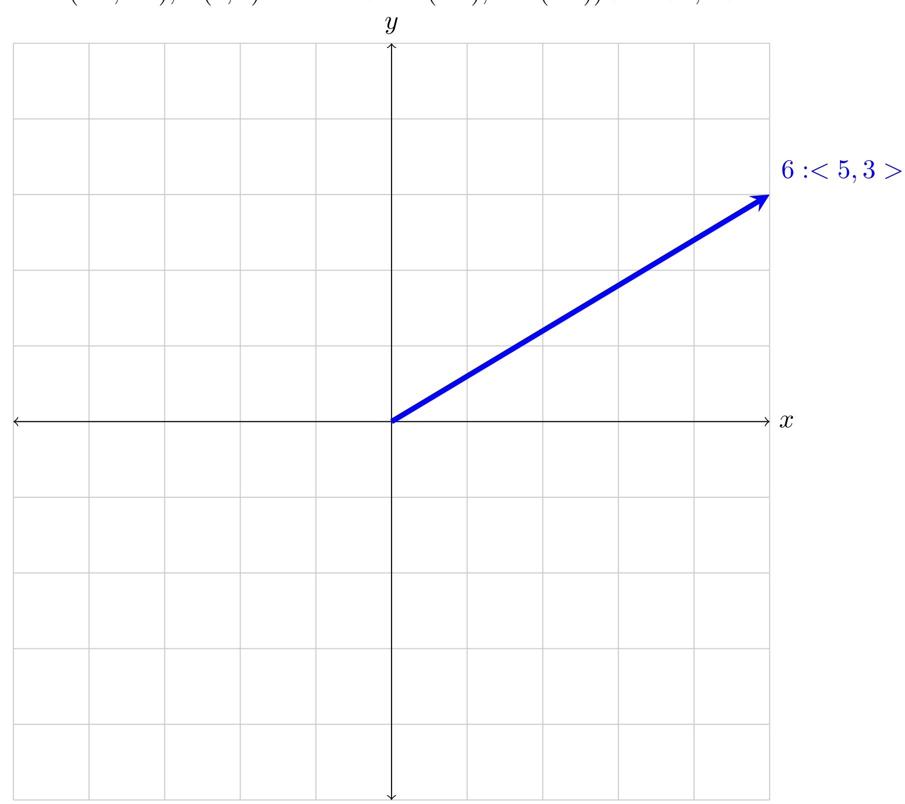
Find a vector a with representation given by the directed line segment AB. Draw AB

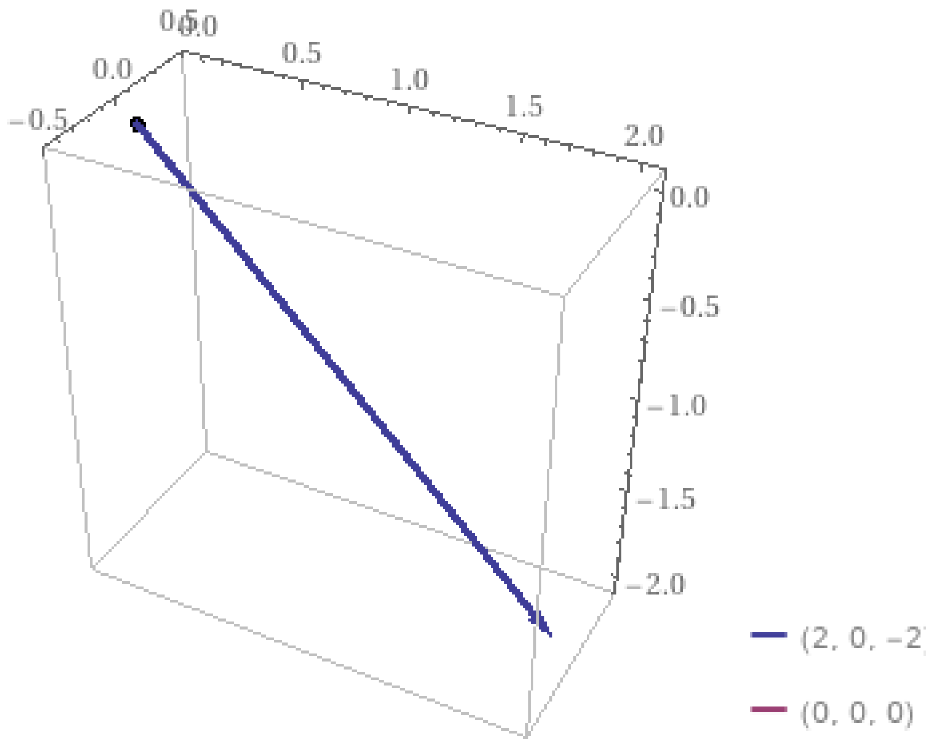
$5 : A(-1, 1), B(3, 2) : AB =< 3 - (-1), 2 - 1 >=< 4, 1 >$



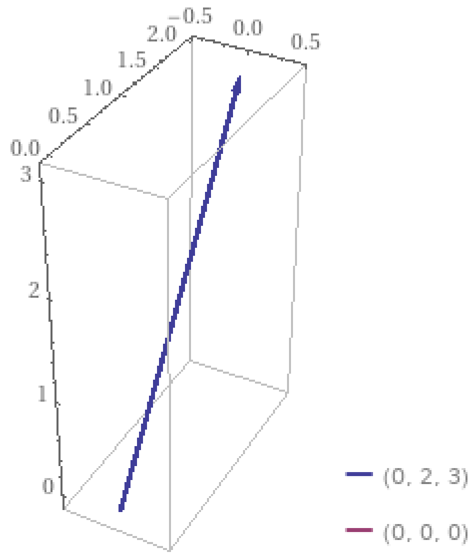
$6 : A(-4,-1), B(1,2) : AB =< 1-(-4), 2-(-1)) >=< 5, 3 >$



$7 : A(0,3,1), B(2,3,-1) : AB =< 2-0, 3-3, (-1)-1 >=< 2, 0, -2 >$

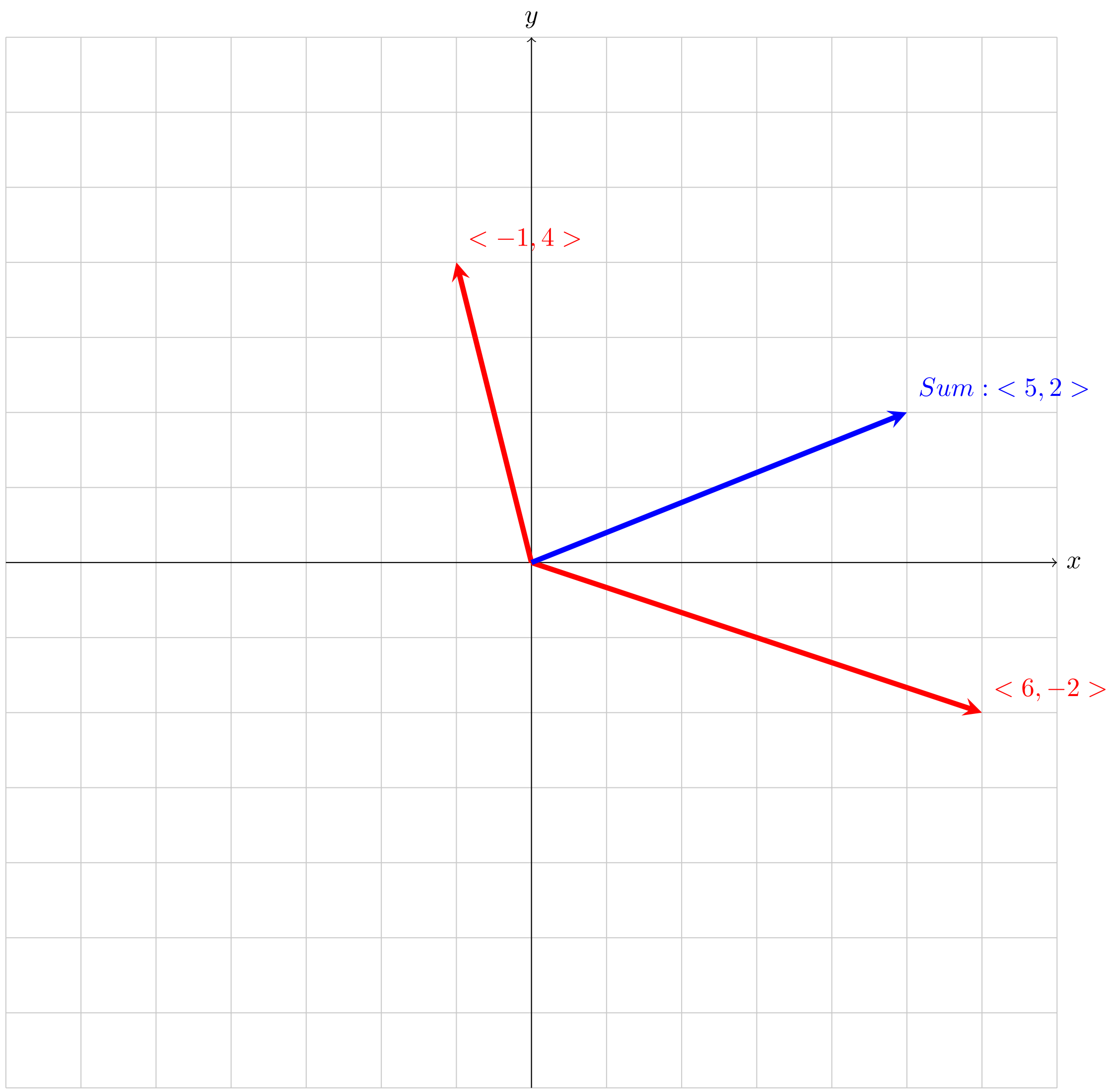


$8\ :\ A(4,0,-2), B(4,2,1)\ :\ AB\ =<\ 4-4, 2-0, 1-(-2)\ >=<\ 0,2,3\ >$

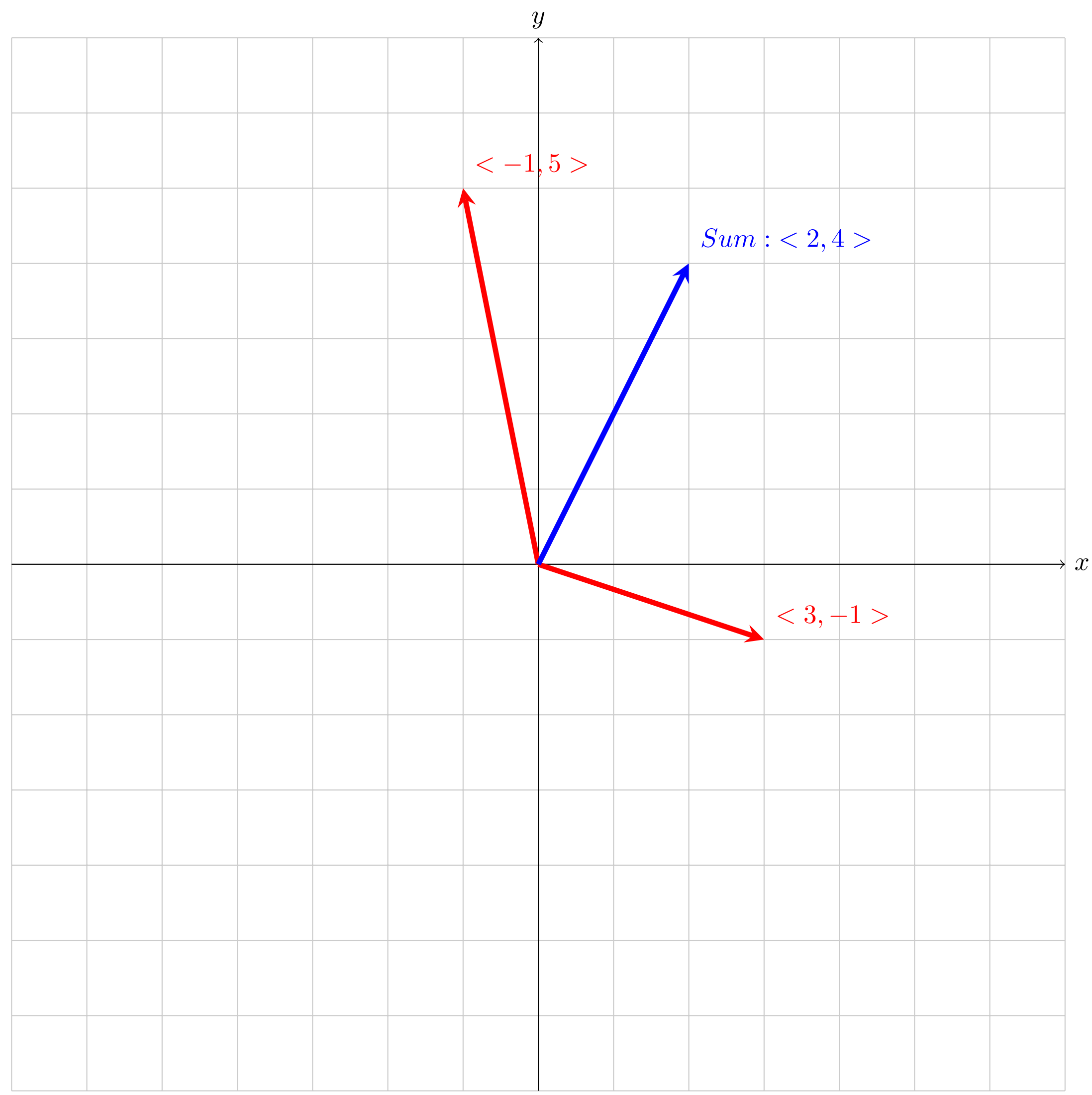


Calculus III Homework 3 Question 3
Section 10.2 # 9 - 12

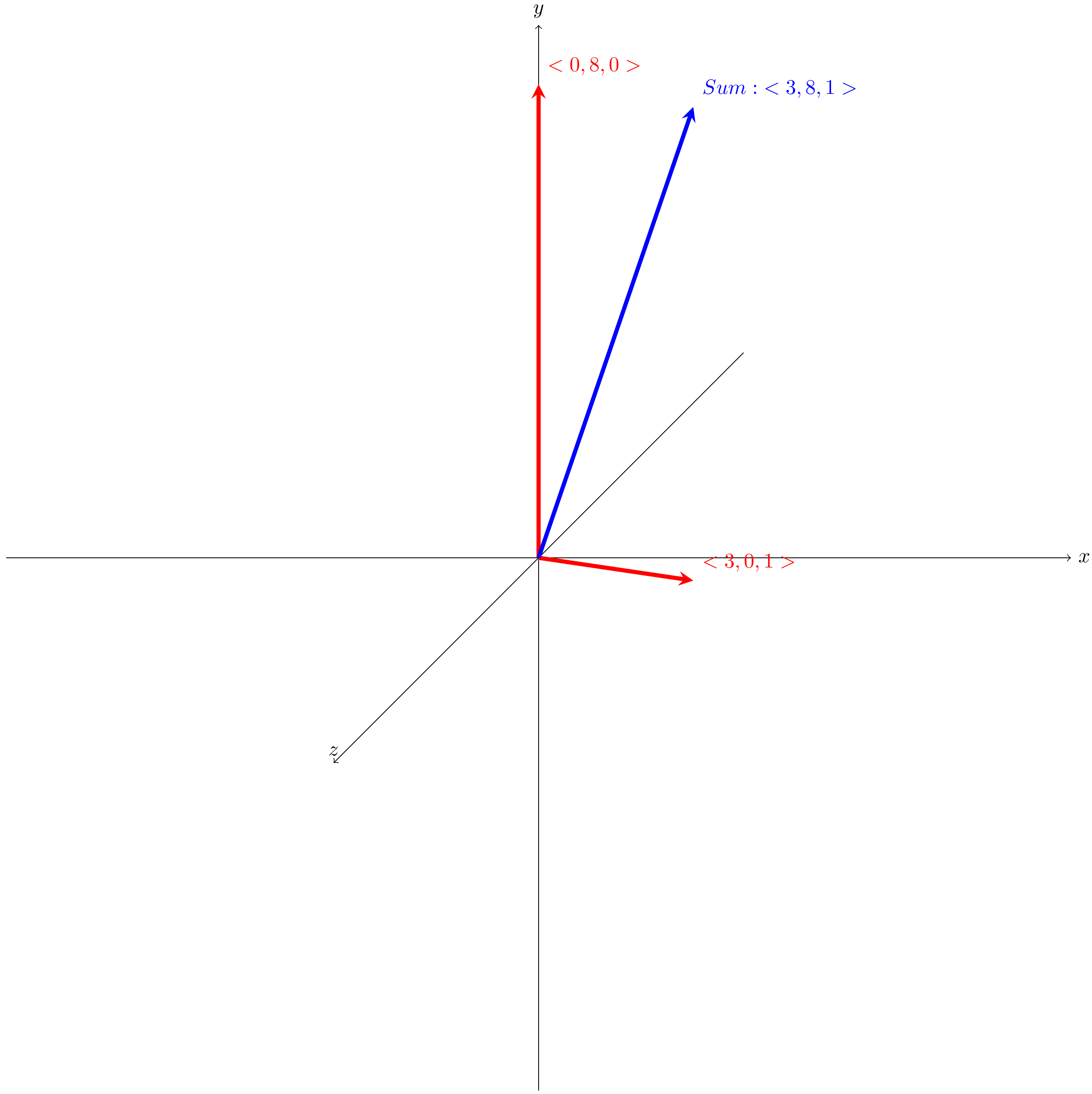
9. Find the sum of $< -1, 4 >$ and $< 6, -2 >$ and graph them



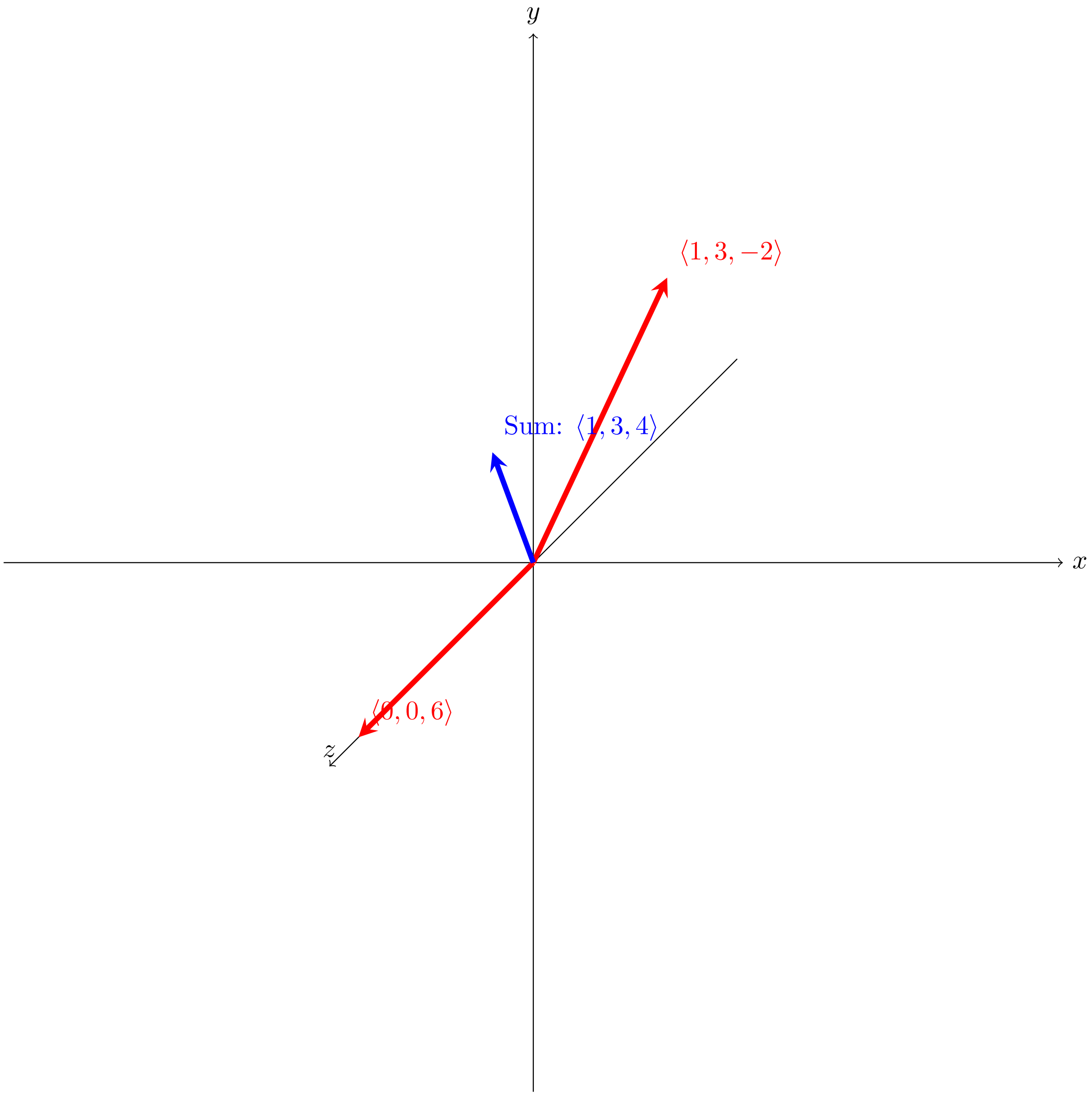
10. Find the sum of $< 3, -1 >$ and $< -1, 5 >$ and graph them



11. Find the sum of $< 3, 0, 1 >$ and $< 0, 8, 0 >$ and graph them



12. Find the sum of $< 1, 3, -2 >$ and $< 1, 3, 4 >$ and graph them



Math215

Homework 3

November 24, 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:

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

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

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

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

$$a_1a_2b_3 - a_1a_3b_2 + a_2a_3b_1 - a_2a_1b_3 + a_3a_1b_2 - a_3a_2b_1 = \tag{5}$$

$$a_1a_2b_3 - a_1a_2b_3 + a_2a_3b_1 - a_2a_3b_1 + a_1a_3b_2 - a_1a_3b_2 = \tag{6}$$

$$0 \tag{7}$$

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

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

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

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

$$b_1a_2b_3 - b_1a_3b_2 + b_2a_3b_1 - b_2a_1b_3 + b_3a_1b_2 - b_3a_2b_1 = \tag{12}$$

$$b_1a_2b_3 - b_1a_2b_3 + b_2a_3b_1 - b_2a_3b_1 + b_3a_1b_2 - b_3a_1b_2 = \tag{13}$$

$$0 \tag{14}$$