

Answer on Question #43540 – Math – Vector Calculus

If $\vec{a} = 2\vec{i} - \vec{j} + \vec{k}$ and $\vec{b} = \vec{i} - 3\vec{j} - 5\vec{k}$ find a vector \vec{c} such that $\vec{a}, \vec{b}, \vec{c}$ form the sides of a right angled triangle taken in order .

Solution.

Using the geometric interpretation of the vectors addition the hypotenuse c can be determined as a vector $\vec{c} = -(\vec{a} + \vec{b})$.

Write vectors a and b in three-dimensional Cartesian coordinates form

$$\vec{a} = (2, -1, 1) \quad \vec{b} = (1, -3, -5)$$

Then

$$\vec{c} = -(\vec{a} + \vec{b}) = -(2 + 1, -1 - 3, 1 - 5)$$

$$\vec{c} = -(3, -4, -4)$$

$$\vec{c} = (-3, 4, 4)$$

Answer: $\vec{c} = -3\vec{i} + 4\vec{j} + 4\vec{k}$