

Consider the vectors:

$$\mathbf{A} = \langle 2, 0, 1 \rangle = 2\mathbf{i} + 0\mathbf{j} + 1\mathbf{k}$$

$$\mathbf{B} = \langle 1, 4, -2 \rangle = 1\mathbf{i} + 4\mathbf{j} - 2\mathbf{k}$$

$$\mathbf{C} = \langle 2, 1, 2 \rangle = 2\mathbf{i} + 1\mathbf{j} + 2\mathbf{k}$$

Calculate (if possible):

1. $\mathbf{A} + \mathbf{B} = \langle 3, 4, -1 \rangle$

2. $\mathbf{A} - \mathbf{C} = \langle 0, -1, -1 \rangle$

3. $|\mathbf{A}| = \sqrt{5}$

4. $\mathbf{A} \cdot \mathbf{B} = 0$

5. $\mathbf{B} \cdot \mathbf{C} = 2$

6. $\mathbf{B} \times \mathbf{C} = \langle 10, -6, -7 \rangle$

7. A unit vector in the direction of \mathbf{A} . $\langle 2/\sqrt{5}, 0, 1/\sqrt{5} \rangle$

8. $\text{comp}_{\mathbf{A}}\mathbf{B} = 0/\sqrt{5} = 0$

9. $\text{proj}_{\mathbf{A}}\mathbf{B} = \mathbf{0}$

10. The size of the angle between vectors \mathbf{A} and \mathbf{C} in degrees.

$$\cos \theta = 6/(\sqrt{5}\sqrt{9}) = 0.894427 \rightarrow \theta = 26.57^\circ \text{ or } 0.463 \text{ radians}$$