

Answer on Question #55355 – Math – Calculus

Question

Find a vector that has direction angles $\alpha = 75^\circ$ and $\beta = 128^\circ$.

Fully explain your method. Is there more than one possible answer?

Why?

What do they have in common?

Solution

There is an expression for the direction angles:

$$\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma = 1,$$

where α , β and γ are direction angles. Given the values of α and β , we can find the value of γ :

$$\cos \gamma = \sqrt{1 - \cos^2 \alpha - \cos^2 \beta}$$

or

$$\cos \gamma = -\sqrt{1 - \cos^2 \alpha - \cos^2 \beta}$$

We can see that more than one answer is possible, because there are two possible values of γ . These two vectors lie in the same line, but have opposite direction. So these vectors will be collinear.

It happens because angles α and β defines the line, but not direction on the line. We also have a set of vectors which differ in the length, because every vector can be represented as

$$(r \cdot \cos \alpha; r \cdot \cos \beta; r \cdot \cos \gamma),$$

where r is the length of the vector.