

Quiz 2

MA 225 A1, 5/29/12

1. (a) Your friend tells you that she was computing the *cross product* of $\vec{u}$ and $\vec{v}$ and got an answer of 5. Explain to her how you know she made a mistake. (b) She stops you mid-sentence and says “Oh, wait, I see my mistake. My answer is actually $5\vec{u}$.” Kindly explain how you know that she is still wrong.

Solution. (a) The cross product of two vectors produces a vector, not a scalar. (b) The cross product of two non-parallel vectors $\vec{u}$ and $\vec{v}$ yields a vector which is orthogonal to *both* $\vec{u}$ and $\vec{v}$. However, $5\vec{u}$ is parallel to $\vec{u}$.

2. (a) Another friend is computing the *dot product* of $\vec{u}$ and $\vec{v}$ and gets the vector $\vec{0}$ as an answer. You’re starting to get annoyed, but yet you patiently explain his error (do so below). (b) This friend is quick to understand. He realizes that the actual answer is 0. Based on his answer, what can you tell your friend about the relationship between $\vec{u}$ and $\vec{v}$?

Solution. (a) The dot product of two vectors produces a scalar, not a vector. (b) Based on your friend’s answer, the two vectors are orthogonal.