MATH 275 – Section 002 – Quiz 2

You may work with other class members on this quiz, but you may not receive assistance from people not in MATH 333 (Section 002). You must show all of your work to receive full credit. Do all your work on other sheets of paper and be sure to staple all the pieces of paper together or YOU WILL GET A ‘ZERO’ ON THE QUIZ. Do not use decimal approximations unless asked to do so. Your work on this quiz must be handed in by Friday, 2 February 2007 at 1440. GOOD LUCK!

1) Let

\[ \mathbf{a} \cdot \mathbf{b} = 0 \]

and

\[ \mathbf{a} = \mathbf{b} + \mathbf{c}. \]

Prove:

\[ |\mathbf{a}|^2 + |\mathbf{b}|^2 = |\mathbf{c}|^2. \]

What have you just proved?

2) Let \( \mathbf{a} \) be a non-zero vector.

   a) Prove that

   \[ \mathbf{a} \times \mathbf{b} = \mathbf{a} \times \mathbf{c} \]  \hspace{1cm} (1)

   does not guarantee

   \[ \mathbf{b} = \mathbf{c}. \]  \hspace{1cm} (2)

   b) Prove that (1), combined with

   \[ \mathbf{a} \cdot \mathbf{b} = \mathbf{a} \cdot \mathbf{c} \]

   does guarantee (2).

3) Prove:

\[ |\mathbf{a} \times \mathbf{b}| = \sqrt{|\mathbf{a}|^2 |\mathbf{b}|^2 - (\mathbf{a} \cdot \mathbf{b})^2} \]