

Quiz 8

This quiz is graded out of 12 marks. No books, watches, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. (4 marks) Use vectors to prove that the two diagonals of a parallelogram bisect each other.

Question 2.¹ Let \vec{u} and \vec{v} be two unit vectors in \mathbb{R}^n which are orthogonal to each other. Compute the following.

a. (2 marks) $(2\vec{u} + \vec{v}) \cdot (\vec{u} - 5\vec{v})$

b. (2 marks) $\|\vec{u} + 4\vec{v}\|$

Question 3. Determine whether the following statement is true or false. If the statement is false provide a counterexample. If the statement is true provide a proof of the statement.

a. (2 marks) If $\vec{u} \cdot \vec{v} = \vec{u} \cdot \vec{w}$, then $\vec{v} = \vec{w}$.

b. (2 marks) If $\vec{u} + \vec{v} = \vec{u} + \vec{w}$, then $\vec{v} = \vec{w}$.

¹From a John Abbott Final Examination