Name: _____
Student ID: _____

Quiz 11

This quiz is graded out of 10 marks. No books, calculators, 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. *(5 marks)* §4.1 #1 Let V be the set of all ordered pairs of real numbers, and consider the following addition and scalar multiplication operations on $\vec{u} = (u_1, u_2)$ and $\vec{v} = (v_1, v_2)$:

$$\vec{u} + \vec{v} = (u_1 + u_2, v_1 + v_2) \text{ and } k\vec{u} = (0, ku_2)$$

a. Compute $\vec{u} + \vec{v}$ and $k\vec{u}$ for $\vec{u} = (-1, 2)$, $\vec{v} = (3, 4)$, and $k = 3$.

b. In words, explain why V is closed under addition and scalar multiplication.

c. Since addition on V is the standard addition operation on $\mathbb{R}^2$, certain vector space axioms hold for V because they are known to hold for $\mathbb{R}^2$. Which axioms are they?

d. Show that Axioms 7, 8, and 9 hold.

e. Show that Axiom 10 fails and hence that V is not a vector space under the given operations.

Question 2. *(5 marks)* §4.2 #2c Use the subspace test to determine which of the following are subspaces of M_{nn}.

The set of all $n \times n$ matrices A such that $\text{tr}(A) = 0$.