Name: _____

Quiz 10

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.

a. *(2 marks)* Find a homogeneous linear system of two equations in three unknowns whose solution space consists of those vectors in $\mathbb{R}^3$ that are orthogonal to $\mathbf{a} = (-3, 2, -1)$ and $\mathbf{b} = (0, -2, -2)$.

b. *(1 mark)* What kind of geometric object is the solution space?

c. *(2 marks)* Find a general solution of the system obtained in part a.

Question 2.[1] *(4 marks)* Find the point of intersection of the line $(x, y, z) = (9, -1, 3) + t(5, 1, 1)$ where $t \in \mathbb{R}$ with the plane containing both the y-axis and the z-axis.

Question 3. *(3 marks)* 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.

The general solution of the nonhomogeneous linear system $A\mathbf{x} = \mathbf{b}$ can be obtained by adding $\mathbf{b}$ to the general solution of the homogeneous linear system $A\mathbf{x} = \mathbf{0}$.

[1] John Abbott Final Examination