Name: _____ Total: 15 marks

Show all your work and justify your answers.

Note: This quiz is representative of the difficulty level of Test 1, but covers only a small portion of the content that will be assessed.

Question 1. (5 marks) Solve for the matrix A where

$$A^T \begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix} = \left(\begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} - 2(A^{-1})^T \right)^{-1}.$$

Question 2. (5 marks) Show that every matrix A can be factored as $A = UR$, where U is invertible and R is in reduced row-echelon form.

Question 3. (5 marks) Find a sequence of elementary row operations that brings

$$\begin{bmatrix} b_1+c_1 & b_2+c_2 & b_3+c_3 \\ c_1+a_1 & c_2+a_2 & c_3+a_3 \\ a_1+b_1 & a_2+b_2 & a_3+b_3 \end{bmatrix} \quad \text{to} \quad \begin{bmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{bmatrix}.$$