MAU11S02 fourth Friday quiz, week 5
Friday 5/3/21 due 1pm Friday 12/3/21

Rules and procedures.
1. Attempt 3 questions. Only *your first three answers* will be marked. **2.** Each question carries 20 marks, so the maximum quiz mark is 60. **3.** If a particular method of solution is stipulated, you get no marks if you don't use it. **4.** ***Show all work.*** No marks will be given for answers which do not show the calculations. **5.** Your answers should be scanned and submitted to Blackboard as a 'Friday assignment.'

Question 1. Let

$$P = \begin{bmatrix} 1 \\ -3 \\ 3 \end{bmatrix},\ Q = \begin{bmatrix} 2 \\ -7 \\ 6 \end{bmatrix},\ R = \begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix},\ T = \begin{bmatrix} 4 \\ 7 \\ 1 \end{bmatrix}$$

Given that P, Q, R is a 'new' basis for a 'new' coordinate system, (i) Give the change-of-basis matrix S. (ii) Supposing that T gives the 'new' coordinates for a point, calculate its 'old' or 'standard' coordinates.

Question 2. Continuing question 1, supposing that T gives the standard coordinates for a point, calculate its 'new' coordinates.

Question 3. Let A be the following matrix

$$\begin{bmatrix} 1 & 2 & 0 & 2 & 4 & -5 \\ 1 & 1 & -1 & -2 & -1 & 1 \\ 1 & 0 & -2 & -6 & -6 & 5 \\ 2 & 2 & -1 & -2 & -1 & -1 \\ 1 & 2 & 0 & 2 & 4 & -2 \end{bmatrix}$$

Bring to RREF *and hence* calculate bases for (i) the row and (ii) column space of A.

Question 4. Use the RREF for the matrix A of question 3 to compute a basis for the kernel (nullspace).

Question 5. Let $W_3 = (2, 10, 11)$. (i) Calculate a right-handed orthonormal basis X_1, X_2, X_3 where $X_3 = W_3/|W_3|$. (ii) Show the change-of-basis matrix S.