Answer all the questions

Q1

a) Find a spanning set and its dimension for the null space of the matrix
b) Find also the rank of A. Rank is the number of non zero rows of the reduced row echelon form

$$\mathbf{A} = \begin{bmatrix} -3 & 6 & -1 & 1 & -7 \\ 1 & -2 & 2 & 3 & -1 \\ 2 & -4 & 5 & 8 & -4 \end{bmatrix}.$$

Q2

Find a basis for Null(A) and the dim Null(A) if

$$\mathbf{A} = \begin{bmatrix} -2 & 4 & -2 & -4 \\ 2 & -6 & -3 & 1 \\ -3 & 8 & 2 & -3 \end{bmatrix}.$$

Q3

Find a basis for Col(A) and the dim Col(A) if

$$\mathbf{A} = \begin{bmatrix} 1 & 2 & 3 & -4 & 8 \\ 1 & 2 & 0 & 2 & 8 \\ 2 & 4 & -3 & 10 & 9 \\ 3 & 6 & 0 & 6 & 9 \end{bmatrix}.$$

Q4

Consider the following matrix

$$\mathbf{A} = \begin{bmatrix} 6 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 7 & 0 & 0 \\ -1 & 0 & 0 & -4 & 0 \\ 8 & -2 & 3 & 0 & 7 \end{bmatrix}.$$

a) Diagonalize A
b) Hence find A^{-1} and A^5