

Quiz 2

For the following questions, use the matrix A listed below:

$$A = \begin{bmatrix} 2 & -4 & 9 & 5 & -5 \\ -3 & 6 & -10 & 3 & 4 \\ 1 & -2 & -1 & -14 & 3 \end{bmatrix} \quad \text{ref} \quad \begin{bmatrix} 1 & -2 & 0 & -11 & 2 \\ 0 & 0 & 1 & 3 & -1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

1. (2 points) Find a basis for the Row Space of A.

$$\text{basis is } \{ (2, -4, 9, 5, -5), (-3, 6, -10, 3, 4) \}$$

(pick any 2)

2. (2 points) Find a basis for the Column Space of A.

$$\text{basis is } \left\{ \begin{bmatrix} 2 \\ -3 \\ 1 \end{bmatrix}, \begin{bmatrix} 9 \\ -10 \\ -1 \end{bmatrix} \right\}$$

3. (3 points) Find a basis for the Null Space of A.

$$\begin{aligned} x_1 &= 2x_2 + 11x_4 - 2x_5 \\ x_3 &= -3x_4 + x_5 \end{aligned} \quad \Rightarrow \quad \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \\ 0 \\ 0 \\ 0 \end{bmatrix} x_2 + \begin{bmatrix} 11 \\ 0 \\ -3 \\ 1 \\ 0 \end{bmatrix} x_4 + \begin{bmatrix} -2 \\ 0 \\ 1 \\ 0 \\ 1 \end{bmatrix} x_5$$

$$\text{basis is } \left\{ \begin{bmatrix} 2 \\ 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 11 \\ 0 \\ -3 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} -2 \\ 0 \\ 1 \\ 0 \\ 1 \end{bmatrix} \right\}$$

4. (3 points) Determine the rank of A, the nullity of A, and the dimension of the row space of A.

$$\text{Rank } A = 2$$

$$\text{nullity of } A \text{ is } 3$$

$$\dim(\text{Row } A) = 2$$