

1. Let $A = \begin{bmatrix} 1 & 24 & -13 & -12 \\ 1 & 3 & -2 & -1 \\ 7 & 0 & -3 & 4 \end{bmatrix}$. Find bases for $\text{col}(A)$, $\text{nul}(A)$, and $\text{row}(A)$.
2. If A is 6×11 of rank 4, what is the dimension of $\text{nul}(A)$?
3. If A is the matrix corresponding to a one-one linear transformation $T : \mathbb{R}^4 \rightarrow \mathbb{R}^8$, what is the dimension of $\text{nul}(A)$? of $\text{row}(A)$? of $\text{nul}(A^T)$?
4. Suppose that A is $m \times n$ where $A\mathbf{x} = \mathbf{b}$ is consistent for all $\mathbf{b} \in \mathbb{R}^m$. How many solutions does $A^T\mathbf{y} = 0$ have?