
Exercise 1 Consider matrix A and $\text{rref}(A)$ shown below.

$$A = \begin{bmatrix} 1 & 2 & 1 & 0 & -1 \\ 1 & 2 & 2 & 3 & 0 \\ 0 & 0 & 1 & 3 & 1 \end{bmatrix} \rightsquigarrow \begin{bmatrix} 1 & 2 & 0 & -3 & -2 \\ 0 & 0 & 1 & 3 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix} = \text{rref}(A)$$

Find each of the following:

$$\text{rank}(A) = \dots \dots$$

$$\dim(\text{row}(A)) = \dots \dots$$

$$\dim(\text{col}(A)) = \dots \dots$$

$$\dim(\text{null}(A)) = \dots \dots$$

Select an appropriate basis for $\text{row}(A)$.

Multiple Choice:

1. $\left\{ \begin{bmatrix} 1 & 2 & 1 & 0 & -1 \end{bmatrix}, \begin{bmatrix} 1 & 2 & 2 & 3 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 & 1 & 3 & 1 \end{bmatrix} \right\}$
2. $\left\{ \begin{bmatrix} 1 & 2 & 0 & -3 & -2 \end{bmatrix}, \begin{bmatrix} 0 & 0 & 1 & 3 & 1 \end{bmatrix}, \begin{bmatrix} 0 & 0 & 0 & 0 & 0 \end{bmatrix} \right\}$
3. $\left\{ \begin{bmatrix} 1 & 2 & 0 & -3 & -2 \end{bmatrix}, \begin{bmatrix} 0 & 0 & 1 & 3 & 1 \end{bmatrix} \right\}$

Using the algorithm in [Subspaces of \$\mathbb{R}^n\$ Associated with Matrices](#), find a basis for $\text{col}(A)$.

$$\left\{ \begin{bmatrix} \dots \\ \dots \\ \dots \end{bmatrix}, \begin{bmatrix} \dots \\ \dots \\ \dots \end{bmatrix} \right\}$$