Multivar Quiz #9 Saaif Ahmed

Wednesday, November 18, 2020 8:34 PM

Honor Pledge:

"I have neither given nor received any illegal aid on this exam"

-Saaif Ahmed 11/11/20

Problem 8

Find bases of the range, $\mathcal{R}(A)$, and null space, $\mathcal{N}(A)$, of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 2 & 1 \\ 1 & 3 & -1 \end{bmatrix}$, and describe them geometrically.

$$A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 2 & 1 \\ 1 & 3 & -1 \end{bmatrix}$$

$R2' = R2 - R1$
$R3' = R3 - R1$
$R3'' = R3' - 2R2$

$$A = \begin{bmatrix} 1 & 1 & 3 \\ 0 & 1 & -2 \\ 0 & 0 & 0 \end{bmatrix}$$

Answer:

Null Space = $R3\ [0,0,0] \rightarrow\ y = 2z$

$\boldsymbol{R}(A) = [1,1,3], [0,1,-2]$

Geometrically the null space is a straight line

The range is a plane determined by the two vectors