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Today's IIScian Approach

Q. let $A_{4\times4}$ matrix. suppose that the null space $N(A)$ of A is

$N(A) := \{(x,y,z,w) \in \mathbb{R}^4 : x+y+z=0, x+y+w=0\}$. Then

1. $\dim(\text{column space}(A)) = 1$
3. $\rho(A) = 1$
2. $\dim(\text{column space}(A)) = 2$
4. $S = \{(1,1,0), (1,1,0,1)\}$ is a basis of $N(A)$.

Sol:- HOW to $\boxed{\text{THINK}}$

First recall some basic facts:-

- Column space of a matrix is the image of the corresponding matrix transformation.
- The dimension of the column space is called the rank of the matrix.
- ~~Her~~ Here $(x,y,z,w) \in N(A) \iff x+y+z=0=x+y+w$
  i.e. $z=-x-y$, $w=-x-y$.
- $N(A) = \{(x, y, -x-y, -x-y) : x,y \in \mathbb{R}\}$.
- $\text{nullity}(A) = \dim(N(A)) = 2$
- By Rank-nullity Th:- $\rho(A) + \text{nullity}(A) = 4$ $(\because A_{4\times4})$
  i.e. $\rho(A)+2 = 4 \Rightarrow \boxed{\rho(A)=2}$ ///

Regular Batch:- . NBHM || NET || GATE ... 2nd July
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