

6. State whether each of the following statements is (always) true, or is (possibly) false, in the box after the statement.

- If you say the statement may be false, you must give an explicit example - with numbers, matrices, or functions, as is appropriate!
- If you say the statement is always true, you must give a clear explanation.

(a) The kernel of the matrix $\begin{bmatrix} 1 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ has dimension 1.


$$\dim(\ker(A)) = \text{parameters}$$

$$\dim(\ker(A)) = \text{columns} - \text{rank}$$

$$\dim(\ker(A)) = 3 - 2 = 1 \quad \checkmark$$

The dimension of the kernel is equal to the number of parameters in the matrix, and since there is only one parameter, the dimension is 1. 1.5


ANSWER

True 

(b) If a linear system is inconsistent, it cannot be homogeneous.

A linear system is inconsistent when $\text{Rank}(A) < \text{Rank}[A|b]$

For the $\text{Rank}(A)$ to be less than $\text{Rank}[A|b]$, the right hand side of the matrix must have numbers other than 0. If the

matrix $[A|b]$ is a homogeneous system, it will be consistent as a degenerate system will always work. 

ANSWER

True 