2270-2, LINEAR ALGEBRA 01/18/05
TRUE OR FALSE PROBLEMS IN CHAPTER 1

Determine whether the following statement is True or False.

1. A system of four linear equations in three unknowns is always inconsistent.

2. There exists a 3×4 matrix with rank 4.

3. If A is a 3×4 matrix and vector $\vec{v}$ is in $\mathbb{R}^4$, then vector $A\vec{v}$ is in $\mathbb{R}^3$.

4. If the 4×4 matrix A has rank 4, then any linear system with coefficient matrix A will have a unique solution.

5. rank $\begin{bmatrix} 2 & 2 & 2 \\ 2 & 2 & 2 \\ 2 & 2 & 2 \end{bmatrix}$ =2.

6. There exists a matrix A such that $A \begin{bmatrix} -1 \\ 2 \end{bmatrix} = \begin{bmatrix} 3 \\ 6 \\ 7 \end{bmatrix}$.

7. Vector $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ is a linear combination of $\begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}$ and $\begin{bmatrix} 7 \\ 8 \\ 9 \end{bmatrix}$.

8. If A is a nonzero matrix of the form $\begin{bmatrix} a & -b \\ b & a \end{bmatrix}$ then the rank of A must be 2.

9. If A and B are matrices of the same size, then the formula $rk(A+B) = rk(A)+rk(B)$ must hold.

10. If A is a 3×4 matrix of rank 3, then the system $A\vec{x} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ must have infinitely many solutions.

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