Matrices in Geometry - 12.363

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Problem Statement

The system of linear equations $\mathbf{A}\mathbf{x} = \mathbf{0}$, where $\mathbf{A}$ is a $n \times n$ matrix, has a non-trivial solution ONLY if,

(a) rank of $\mathbf{A} > n$

(b) rank of $\mathbf{A} = n$

(c) rank of $\mathbf{A} < n$

(d) $\mathbf{A}$ is an identity matrix

Solution

For a system of linear equations $\mathbf{A}\mathbf{x} = \mathbf{0}$ to have a non-trivial solution, $\mathbf{A}$ has to be a singular matrix, this implies that

$$rank\left(\mathbf{A}\right) < n \tag{1}$$

which is the option (c).