

True or False

1. The image of a 3×4 matrix is a subspace of \mathbb{R}^4 .
2. The column vectors of a 5×4 matrix must be linearly dependent.
3. If a subspace V of \mathbb{R}^n contains none of the standard vectors $\mathbf{e}_1, \dots, \mathbf{e}_n$, the V consists of the zero vector only.
4. If the image of an $n \times n$ vector A is all of \mathbb{R}^n , then A must be invertible.
5. If A and B are $n \times n$ matrices and \mathbf{v} is in the kernel of both A and B , then \mathbf{v} is also in the kernel of AB .

6. The vectors

$$\begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 2 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 3 \\ 2 \\ 1 \end{pmatrix}$$

form a basis for \mathbb{R}^3 .

7. If $2\mathbf{u} + 3\mathbf{v} + 4\mathbf{w} = 5\mathbf{u} + 6\mathbf{v} + 7\mathbf{w}$, then the vectors \mathbf{u} , \mathbf{v} , and \mathbf{w} must be linearly dependent.