TRUE OR FALSE PROBLEMS IN CHAPTER 7

Determine whether the following statement is True or False.

All matrices are square matrices unless otherwise stated.

1. If 0 is an eigenvalue of a matrix $A$, then $\det(A) = 0$.

2. If $\vec{v}$ is an eigenvector of $A$, then $\vec{v}$ must be an eigenvector of $A^3$ as well.

3. The matrix of any orthogonal projection on a line $L$ in $\mathbb{R}^2$ is diagonalizable.

4. If an invertible matrix $A$ is diagonalizable, then $A^{-1}$ must be diagonalizable as well.

5. If $\vec{v}$ and $\vec{w}$ are linearly independent eigenvectors of $A$, then $\vec{v} + \vec{w}$ is also an eigenvector of $A$.

6. There exits a $4 \times 4$ diagonalizable nonzero matrix $A$ such that $A^4 = O_4$.

7. If $\vec{v}_1, \vec{v}_2, \ldots, \vec{v}_n$ is an eigenbasis for both $A$ and $B$, then $AB = BA$.

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