

**2270-2, LINEAR ALGEBRA 04/07/05**  
**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 exists a  $4 \times 4$  diagonalizable nonzero matrix  $A$  such that  $A^4 = O_4$ .
7. If  $\vec{v}_1, \vec{v}_2, \dots, \vec{v}_n$  is an eigenbasis for both  $A$  and  $B$ , then  $AB = BA$ .