

Diagonalization

1. What are the eigenvalues of $D = \begin{bmatrix} 2 & 0 \\ 0 & 3 \end{bmatrix}$?
 - (a) 2 and 3
 - (b) 0 and 2
 - (c) 0 and 3
 - (d) 5 and 6

2. If $D = \begin{bmatrix} 2 & 0 \\ 0 & 3 \end{bmatrix}$, what is D^5 ?
 - (a) $\begin{bmatrix} 2 & 0 \\ 0 & 3 \end{bmatrix}$
 - (b) $\begin{bmatrix} 10 & 0 \\ 0 & 15 \end{bmatrix}$
 - (c) $\begin{bmatrix} 2^5 & 0 \\ 0 & 3^5 \end{bmatrix}$
 - (d) Too hard to compute by hand.

3. Why might we be interested in diagonalizing a matrix?
 - (a) Because it is easy to find the eigenvalues of a diagonal matrix.
 - (b) Because it is easy to compute powers of a diagonal matrix.
 - (c) Both of these reasons.

4. Which of the following statements are true?
 - (a) An $n \times n$ matrix with n linearly independent eigenvectors is diagonalizable.
 - (b) Any diagonalizable $n \times n$ matrix has n linearly independent eigenvectors.
 - (c) Both are true.
 - (d) Neither is true.

5. Which of the following statements are true?

- (a) An $n \times n$ matrix with n distinct eigenvalues is diagonalizable.
- (b) Any diagonalizable $n \times n$ matrix has n distinct eigenvalues.
- (c) Both are true.
- (d) Neither is true.

6. Which of the following statements are true?

- (a) If A is a diagonalizable matrix, then A does not have any zero eigenvalues.
- (b) If A does not have any zero eigenvalues, then A is diagonalizable.
- (c) Both are true.
- (d) Neither is true.

7. **True or False** Invertible matrices are diagonalizable.