1. Compute A^4 and A^k where k is a positive integer.

$$A = \begin{bmatrix} 5 & -3 \\ 6 & -4 \end{bmatrix}$$

2. Invertibility and diagonalizability have nothing to do with each other. Match each matrix with a description.

A. $\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 2 & 0 \\ 0 & 3 \end{bmatrix}$

C. $\begin{bmatrix} 5 & 1 \\ 0 & 5 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$

i. Invertible but not diagonalizable

ii. Diagonalizable but not invertible

iii. Both

iv. Neither

3. If A is a 3×3 matrix with eigenvalues $\lambda = -2, 3, 5$ can you guarantee that A is diagonalizable?

4. If A is a 5×5 matrix with eigenvalues $\lambda = -2, 3, 5$ can you guarantee that A is diagonalizable?

5. If A is a 4×4 matrix with three eigenvalues. One eigenspace is 1-dimensional and one of the other eigenspaces is 2-dimensional. Is it possible that A is not diagonalizable?