

WORKSHEET 11/9/22
MATH 2331, FALL 2022

- (1) Let $A = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 \end{bmatrix}$. Calculate A^5 , $\det(A)$, and $\text{rank}(A)$. Find a basis for $\ker(A)$.
- (2) Can you find an eigenvector of the identity matrix? What is the eigenvalue?
- (3) Can you find an eigenvector for projection onto the line parallel to $\begin{bmatrix} 3 \\ 4 \end{bmatrix}$? Can you find another? What are the eigenvalues?
- (4) What can you say about an eigenvector with eigenvalue 0?
- (5) Can you find an eigenvector for rotation by an angle θ in \mathbb{R}^2 ? What is the eigenvalue?
- (6) Can you find an eigenvector for reflection across the line parallel to $\begin{bmatrix} 3 \\ 4 \end{bmatrix}$? Can you find another? What are the eigenvalues?
- (7) What can you say about the eigenvalues of an orthogonal matrix?