WORKSHEET 11/9/23
MATH 2331, FALL 2023

(1) Find the eigenvectors of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 3 & 2 \\ 0 & 1 & 2 \end{bmatrix}$.

(2) Suppose that $\vec{v}_1$ and $\vec{v}_2$ are eigenvectors of A with eigenvalues λ_1 and λ_2, respectively.
   (a) Is $5\vec{v}_1$ an eigenvector of A?
   (b) Is $\vec{v}_1 + \vec{v}_2$ an eigenvector of A?

(3) Let A be an $n \times n$ matrix.
   (a) Is the collection of eigenvectors of A a subspace of $\mathbb{R}^n$?
   (b) Is the collection of eigenvectors of A with eigenvalue λ a subspace of $\mathbb{R}^n$?

(4) Let $A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 0 & 1 \\ 0 & 0 & 1 \end{bmatrix}$.
   (a) Find the eigenvalues of A.
   (b) For each eigenvalue λ, find a basis for the eigenspace E_λ.
   (c) Is A diagonalizable?

(5) For each eigenvalue λ you found in the previous problem, write down its algebraic and geometric multiplicity. Do you notice anything?