

WORKSHEET 11/17/22
MATH 2331, FALL 2022

- (1) Suppose that \vec{v}_1 , \vec{v}_2 , and \vec{v}_3 are eigenvectors of A with eigenvalues λ_1 , λ_2 , and λ_3 , respectively.
- (a) Assume that $\lambda_1 \neq \lambda_2$. Could it be that \vec{v}_1 and \vec{v}_2 linearly dependent?
 - (b) Assume that the three eigenvalues are distinct. Could it be that \vec{v}_1 , \vec{v}_2 , and \vec{v}_3 are linearly dependent?
- (2) Decide whether the following matrix is diagonalizable:

$$\begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 0 & 2 & 3 & 4 & 5 & 6 \\ 0 & 0 & 3 & 4 & 5 & 6 \\ 0 & 0 & 0 & 4 & 5 & 6 \\ 0 & 0 & 0 & 0 & 5 & 6 \\ 0 & 0 & 0 & 0 & 0 & 6 \end{bmatrix}$$

- (3) Find the eigenvalues of the matrix $A = \begin{bmatrix} 1 & 0 & 0 \\ -4 & 0 & 2 \\ 0 & 0 & 1 \end{bmatrix}$.
- (4) Find a basis for each of the eigenspaces of the matrix from #3.
- (5) Is A diagonalizable? If so, write down an invertible matrix S and a diagonal matrix B such that $B = S^{-1}AS$.