Linear Algebra

Prof. Gerhard Jäger, winter term 2023/2024

Assignment 9

1. (2 points) Find the eigenvalues and the eigenvectors of these two matrices:

$$A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix} \text{ and } A + \mathbf{I} = \begin{bmatrix} 2 & 4 \\ 2 & 4 \end{bmatrix}$$

2. (3 points) Find the eigenvalues of A, B, and $A + B$.

$$A = \begin{bmatrix} 3 & 0 \\ 1 & 1 \end{bmatrix}$$

$$B = \begin{bmatrix} 1 & 1 \\ 0 & 3 \end{bmatrix}$$

$$A + B = \begin{bmatrix} 4 & 1 \\ 1 & 4 \end{bmatrix}$$

3. (3 points) Find three linearly independent eigenvectors of P. The eigenvalues of P are $\lambda_1 = 1$ and $\lambda_2 = 0$.

$$P = \begin{bmatrix} .2 & .4 & 0 \\ .4 & .8 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

4. (2 points) Find all real eigenvalues of the permutation matrix

$$P = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix}$$