

Name (Last, First)

1. (5pts) Check if \mathbf{x} is an eigenvector of the matrix A . If so, what is the eigenvalue associated with the eigenvector?

$$\mathbf{x} = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} \text{ and } A = \begin{bmatrix} 2 & 6 & 7 \\ 3 & -1 & -3 \\ 5 & 1 & 4 \end{bmatrix}$$

2. Let T be a linear transformation given as follows:

$$T\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{bmatrix} x + y \\ 2x + 2y \end{bmatrix}.$$

a. (3pts) Find the kernel of T .

b. (2pts) Note that

$$T\left(\begin{bmatrix} 1 \\ 2 \end{bmatrix}\right) = 3 \begin{bmatrix} 1 \\ 2 \end{bmatrix}.$$

Find an invertible matrix P satisfying

$$P^{-1} \begin{bmatrix} 1 & 1 \\ 2 & 2 \end{bmatrix} P = \begin{bmatrix} 0 & 0 \\ 0 & 3 \end{bmatrix}.$$

Please check your answer.