

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?

$$\mathbf{x} = \begin{bmatrix} 1 \\ 0 \\ 1 \\ 0 \end{bmatrix} \text{ and } A = \begin{bmatrix} 2 & 6 & 7 & 0 \\ 3 & -1 & -3 & 0 \\ 5 & 1 & 4 & 0 \\ 1 & 9 & -1 & 9 \end{bmatrix}$$

2. Let A be a 3×3 matrix given as follows:

$$A = \begin{bmatrix} 5 & 0 & 3 \\ 7 & 2 & 9 \\ -4 & 0 & -2 \end{bmatrix}.$$

a. (3pts) Find all eigenvalues of A and compute the (algebraic) multiplicities.

b. (2pts) Compute the dimensions of the eigenspaces.¹

¹Remark. The dimension of the eigenspace is called the geometric multiplicity and this is always less than or equal to the algebraic multiplicity!