Prof. J. Baillieul

Mechanical Engineering

Electrical and Computer
        Engineering

System Engineering Division

(9/24/24)

ENG EC/ME/SE 501:

Exercises (Set 2)   (Due $10/1/24$)

1. For the following two matrices:

$$\mathbf{A} = \begin{pmatrix} -2 & 0 & -1 \\ 4 & 2 & 4 \\ 0 & 0 & -1 \end{pmatrix} \qquad \mathbf{B} = \frac{1}{8} \begin{pmatrix} 9 & 0 & -3 \\ 10 & -8 & 2 \\ 3 & 0 & -1 \end{pmatrix}$$

find (a) the characteristic polynomial; (b) the determinant and trace; (c) the eigenvectors.

2. Find the Jordan Normal Form $\mathbf{J_A}$ of

$$\mathbf{A} = \begin{pmatrix} 5 & -7 & 4 \\ 8 & -7 & 4 \\ 12 & -12 & 7 \end{pmatrix}.$$

3. For the matrix in Problem 2, find a nonsingular matrix (change of basis) $\mathbf{U}$ such that

$$\mathbf{U}^{-1} \cdot \mathbf{A} \cdot \mathbf{U} = \mathbf{J_A}.$$