HOMEWORK SET #8

EE 510: Linear Algebra for Engineering

Assigned: 21 October 2023
Due: 28 October 2023

Directions: Please show all work and box answers when appropriate.

1. Introduction to Linear Algebra by Gilbert Strang (5th Edition):

   a) Problem Set 6.5: #3, #9, #22, #26.

2. Prove that the diagonal elements of a positive definite matrix must be positive.

3. Determine whether the following matrix is positive definite:

$$A = \begin{bmatrix} 2 & -17 & 7 \\ -17 & -4 & -1 \\ 7 & -1 & -14 \end{bmatrix} .$$

4. Consider the following square matrices:

$$A = \begin{bmatrix} 4 & -6 & -4 & 2 \\ -6 & -13 & 2 & -1 \\ -4 & 2 & 9 & -6 \\ 2 & -1 & -6 & 15 \end{bmatrix}$$

$$B = \begin{bmatrix} 4 & -2i & -2 \\ 2i & 10 & -7i \\ -2 & 7i & 21 \end{bmatrix} .$$

Can you find the Cholesky decomposition of these matrices? If yes, find the decomposition. Otherwise, state your reasons. (*Hint: Check the upper-left square submatrices.*)

5. Find the Jordan decomposition of the following matrix:

$$A = \begin{bmatrix} 3 & 0 & 0 & 0 \\ 1 & 4 & 1 & 0 \\ 1 & 0 & 4 & 1 \\ 1 & 0 & 0 & 5 \end{bmatrix} .$$