HOMEWORK SET #9

EE 510: Linear Algebra for Engineering

Assigned: 29 October 2023

Due: 5 November 2023

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

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

   a) Problem Set 10.3: #3, #8, #9.

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

   a) Problem Set 7.2: #2, #4, #8.

3. Find the singular value decomposition of

$$A = \begin{bmatrix} 2 & 2 & -2 \\ 2 & 2 & -2 \\ -2 & -2 & 6 \end{bmatrix} .$$

Find the pseudo-inverse A^+ of matrix A.

4. Consider the following stochastic matrices:

$$A = \begin{bmatrix} \frac{1}{10} & \frac{9}{10} & \frac{1}{5} \\ \frac{4}{5} & 0 & \frac{1}{5} \\ \frac{1}{10} & \frac{1}{10} & \frac{3}{5} \end{bmatrix}$$

$$B = \begin{bmatrix} 0 & \frac{3}{5} & 1 \\ 0 & \frac{1}{5} & 0 \\ 1 & \frac{1}{5} & 0 \end{bmatrix} .$$

Can you find a stochastic equilibrium $\underline{e}$ (or steady state) for these matrices? If yes, find the steady state. Otherwise, state your reasons.

5. Find the singular value decomposition of

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

Find the pseudo-inverse A^+ of matrix A.