HOMEWORK SET #2

EE 510: Linear Algebra for Engineering

Assigned: 1 September 2023
Due: 9 September 2023

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

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

   a) Problem Set 2.3: #3, #25

   b) Problem Set 2.5: #25, #30

   c) Problem Set 2.6: #5, #13.

2. Show that the inverse of a lower triangular matrix A with nonzero diagonal elements is itself lower triangular. (*Hint*: Use the definition of matrix multiplication.)

3. Determine whether $[6, 10, 2]$ is a linear combination of $[1, 3, 2]$, $[2, 8, -1]$, and $[-1, 9, 2]$.

4. Let the system $Ax = b$ be such that $A \in \mathbb{R}^{m \times n}$ and $x \in \mathbb{R}^{n \times 1}$. Is the solution set a subspace of $\mathbb{R}^{n \times 1}$?

5. Show that the intersection of any number of subspaces of a vector space V is a subspace of V.

6. If $S = \{\alpha_1, \alpha_2, ..., \alpha_n\}$ is a finite subset of the vectors in vector space V over field F, the set $\mathcal{L}(S)$ of all linear combinations of S over F forms a subspace of V.