HOMEWORK SET #3

EE 510: Linear Algebra for Engineering

Assigned: 9 September 2023
Due: 16 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 3.1: #10, #20

   b) Problem Set 3.3: #18, #19

   c) Problem Set 3.4: #11, #26.

2. Show that $u = [a, b]$ and $v = [c, d]$ in $\mathbb{R}^2$ are linearly dependent if and only if $ad - bc = 0$.

3. Determine whether the set $\{[3, 2, 1, -4, 1], [2, 3, 0, -1, -1], [1, -6, 3, -8, 7]\}$ is linearly independent.

4. Suppose $\{u_1, ..., u_r, w_1, ..., w_s\}$ is a linearly independent subset of vector space V. Show that $\text{span}(\{u_1, ..., u_r\}) \cap \text{span}(\{w_1, ..., w_s\}) = \{\mathbf{0}\}$.

5. For a matrix A, decide whether the given row vectors B and C belong to the row space $C(A^T)$.

$$A = \begin{bmatrix} 2 & 1 & 3 & 1 \\ 1 & 1 & 3 & 0 \\ 0 & 1 & 2 & 1 \\ 3 & 3 & 8 & 2 \end{bmatrix} \quad B = \begin{bmatrix} 4 \\ 1 \\ 2 \\ 5 \end{bmatrix} \quad C = \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix}$$