Reading Assignment 2

Read Sect. 1.3 and Sect. 1.4

All the notation in these questions can be found in Sect. 1.3 and 1.4. Usually S denotes a sub**set** of a vector space and V denotes a vector space. I am putting arrows on top of the vectors to differentiate from scalars. I think it will help you to differentiate them at first, until you become used to thinking in terms of vectors. Your book uses u's and v's for vectors and a's and b's for scalars.

1. State two ways to prove that a subset of a vector space is a subspace. (Sect. 1.3)

2. What is the definition of symmetric matrix. Give a numerical example of a 3×3 symmetric matrix (Sect. 1.3)

3. What are the examples of subspaces of $M_{n \times n}(F)$ given in Sect. 1.3, don't forget to look in the exercises.

4. What is the smallest subspace that can be the intersection of two subspaces of a vector space? For instance, can the intersection be empty? (Sect. 1.3)

5. Let $S = \{(1, 0, 0), (1, 1, 0)\}$ and $\vec{v} = (3, 1, 0)$. Is $\vec{v}$ a linear combination of elements in S? Can you think of a vector in $\mathbb{R}^3$ that is not a linear combination of the elements in S. (Sect. 1.4)

6. What do you have to find to show that a vector $\vec{v}$ is a linear combination of $\vec{u}_1, \vec{u}_2, \ldots, \vec{u}_n$? (Sect. 1.4)

7. Give an example of a linear system of equation with 2 equations and 3 unknowns? What are the three operations given in Section 1.4 used to solve linear systems of equations? (Sect. 1.4)

8. Give an example of a linear system of equations that satisfies the three conditions at the bottom of page 27. (Sect. 1.4)

9. Give two examples of vectors in span(S) where $S = \{(1, -1, 0), (0, 1, 2)\}$. (Sect. 1.4)

10. Is span(S) a subspace? Why or why not? (Sect. 1.4)

11. What does S spans V mean? Can you find a set that spans $\mathbb{R}^3$ different from the example in Example 3 in Sect. 1.4?

12. Find an equivalent way to say the $\vec{x}$ is in the plane containing $\vec{u}$ and $\vec{v}$.

Practice Problems

Sect. 1.3 # 1 (justify your answers), 2, 5, 8, 12 (what about lower triangular?).

Sect. 1.4 # 1 (justify your answers), 2, 3, 4, 5.