Revision: Summary & Sample Questions.

Ch 6: Vector Spaces

Main Point: Any finite dimensional vector space looks "just like" $\mathbb{R}^n$.

Q1 Is $S = \{A \in M_{nn}(\mathbb{R}) | \det A = 0\}$ a subspace of M_{nn}?

Q2 Is

$$S = \{A \in M_2(\mathbb{R}) | A \begin{pmatrix} 2 \\ -1 \end{pmatrix} = A^T \begin{pmatrix} 1 \\ 1 \end{pmatrix}\}$$

a subspace of M_{22}? If so find a basis for it.

Ch 7: Linear Transformations

Main Points: 1. Any linear map $T : V \longrightarrow W$ between fin dim vector spaces "looks like" matrix multn.

2. Theory of solving linear eqns $T\mathbf{x} = \mathbf{y}$ just like solving systems of linear eqns in $\mathbb{R}$.

Q3 Let $T : M_{22} \longrightarrow \mathbb{R}^2$ be defined by

$$T(A) = A \begin{pmatrix} 2 \\ -1 \end{pmatrix} - A^T \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

Ch 9: Eigenvalues and Eigenvectors

Main Point: Consider linear $T : V \longrightarrow V$, with V fin dim. Identifying V with $\mathbb{F}^n$ involves choosing coordinates. Often, T picks out natural coords.

Q4

$$A = \begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$$

Ch 6: Probability

Main Points: 1. Defined notion of probability density function to setup a theory of probability in discrete and cont case.

2. Developed notion of expected value and variance for random variables.

3. Applications of normal distributions.

Theoretical Q

Let A be a 2×2-matrix over a field $\mathbb{F}$. Show that some (positive) power of A is equal to a linear combination of smaller powers of A.