Math 65
HW 1
Tuesday, May 17, 2016

6.1.{11, 13, 29, 34, 46, 60, 62}, Additional Problem #1

6.1.11 In Exercises 1-11, determine whether the given set, together with the specified operations of addition and scalar multiplication, is a vector space. If it is not, list all of the axioms that fail to hold.

DEF: *A square matrix is called **skew-symmetric** if* $A^T = -A$.

The set of all skew-symmetric $n \times n$ matrices, with the usual matrix addition and scalar multiplication.

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6.1.13 Finish verifying that $\mathscr{F}$ is a vector space (see Example 6.4).

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6.1.29 In Exercises 24-45, use Theorem 6.2 to determine whether W is a subspace of V.

$V = M_{22}, W = \left\{ \begin{bmatrix} a & b \\ c & d \end{bmatrix} : ad \geq bc \right\}$

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6.1.34 In Exercises 24-45, use Theorem 6.2 to determine whether W is a subspace of V.

$V = \mathscr{P}_2, W = \{bx + cx^2\}$

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6.1.46 Let V be a vector space with subspaces U and W. Prove multiplication that $U \cap W$ is a subspace of V.

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6.1.60 Is M_{22} spanned by $\begin{bmatrix}1 & 0\\1 & 0\end{bmatrix}, \begin{bmatrix}1 & 1\\1 & 0\end{bmatrix}, \begin{bmatrix}1 & 1\\1 & 1\end{bmatrix}, \begin{bmatrix}0 & -1\\1 & 0\end{bmatrix}$?

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6.1.62 Is $\mathscr{P}_2$ spanned by $1 + x + 2x^2, 2 + x + 2x^2, -1 + x + 2x^2$?

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Additional Problem #1 For each square matrix below, calculate its eigenvalues and eigenvectors. Then verify that PDP^{-1} is equal to the original matrix, where D is a diagonal matrix with your eigenvalues along its diagonal and P is a matrix with your eigenvectors as its columns.

(a) $\begin{bmatrix} 4 & -1 \\ -2 & 3 \end{bmatrix}$

(b) $\begin{bmatrix} 0 & -4 \\ 1 & 0 \end{bmatrix}$

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