Linear Algebra 4th Edition Friedberg Solutions Manual
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INSTRUCTOR'S MANUAL

to accompany

Linear Algebra: 4th Edition

Stephen H. Friedberg
Arnold J. Insel
Lawrence E. Spence

Illinois State University

Prentice Hall

PEARSON EDUCATION, UpperSaddle River, NJ 07458

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Vector Spaces

1.1 INTRODUCTION

2. **(b)** $x = (2,4,0) + t(-5,-10,0)$ **(d)** $x = (-2,-1,5) + t(5,10,2)$

3. **(b)** $x = (3,-6,7) + s(-5,6,-11) + t(2,-3,-9)$
(d) $x = (1,1,1) + s(4,4,4) + t(-7,3,1)$

4. $(0,0)$

1.2 VECTOR SPACES

2. $\begin{pmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}$

4. **(b)** $\begin{pmatrix} 1 & -1 \\ 3 & -5 \\ 3 & 8 \end{pmatrix}$ **(d)** $\begin{pmatrix} 30 & -20 \\ -15 & 10 \\ -5 & -40 \end{pmatrix}$

(f) $-x^3 + 7x^2 + 4$ **(h)** $3x^5 - 6x^3 + 12x + 6$

5. $\begin{pmatrix} 8 & 3 & 1 \\ 3 & 0 & 0 \\ 3 & 0 & 0 \end{pmatrix} + \begin{pmatrix} 9 & 1 & 4 \\ 3 & 0 & 0 \\ 1 & 1 & 0 \end{pmatrix} = \begin{pmatrix} 17 & 4 & 5 \\ 6 & 0 & 0 \\ 4 & 1 & 0 \end{pmatrix}$

16. Yes **18.** No, (VS 1) fails. **19.** No, (VS 8) fails.

1.3 SUBSPACES

2. **(b)** $\begin{pmatrix} 0 & 3 \\ 8 & 4 \\ -6 & 7 \end{pmatrix}$ **(d)** $\begin{pmatrix} 10 & 2 & -5 \\ 0 & -4 & 7 \\ -8 & 3 & 6 \end{pmatrix}$ The trace is 12. **(f)** $\begin{pmatrix} -2 & 7 \\ 5 & 0 \\ 1 & 1 \\ 4 & -6 \end{pmatrix}$

(h) $\begin{pmatrix} -4 & 0 & 6 \\ 0 & 1 & -3 \\ 6 & -3 & 5 \end{pmatrix}$
The trace is 2.

8. **(b)** No **(d)** Yes **(f)** No

9. $W_1 \cap W_3 = \{0\}$, $W_1 \cap W_4 = W_1$,
$W_3 \cap W_4 = \{(a_1, a_2, a_3) \in R^3 : a_1 = -11a_3 \text{ and } a_2 = -3a_3\}$

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1.4 LINEAR COMBINATIONS AND SYSTEMS OF LINEAR EQUATIONS

2. **(b)** $(-2,-4,-3)$
(d) $\{x_3(-8,3,1,0)+(-16,9,0,2):\ x_3 \in R\}$
(f) $(3,4,-2)$

3. **(a)** $(-2,0,3)=4(1,3,0)-3(2,4,-1)$
(b) $(1,2,-3)=5(-3,2,1)+8(2,-1,-1)$
(d) No
(f) $(-2,2,2)=4(1,2,-1)+2(-3,-3,3)$

4. **(a)** $x^3-3x+5=3(x^3+2x^2-x+1)-2(x^3+3x^2-1)$
(b) No
(c) $-2x^3-11x^2+3x+2=4(x^3-2x^2+3x-1)-3(2x^3+x^2+3x-2)$
(d) $x^3+x^2+2x+13=-2(2x^3-3x^2+4x+1)+5(x^3-x^2+2x+3)$
(f) No

5. **(b)** No **(d)** Yes **(f)** No **(h)** No

11. The span of $\{x\}$ is $\{0\}$ if $x=0$ and is the line through the origin of R^3 in the direction of x if $x \neq 0$.

17. if W is finite

1.5 LINEAR DEPENDENCE AND LINEAR INDEPENDENCE

2. **(b)** Linearly independent **(d)** Linearly dependent
(f) Linearly independent **(h)** Linearly independent
(j) Linearly dependent

10. $(1,0,0)$, $(0,1,0)$, $(1,1,0)$

1.6 BASES AND DIMENSION

2. **(b)** Not a basis **(d)** Basis

3. **(b)** Basis **(d)** Basis

4. No, $\dim(\mathsf{P}_3(R))=4$. **5.** No, $\dim(\mathsf{R}^3)=3$.

8. $\{u_1,u_3,u_5,u_7\}$

10. **(b)** $12-3x$ **(d)** $-x^3+2x^2+4x-5$

14. $\{(0,1,0,0,0),(0,0,0,0,1),(1,0,1,0,0),(1,0,0,1,0)\}$ and $\{(-1,0,0,0,1),(0,1,1,1,0)\}$; $\dim(\mathsf{W}_1)=4$ and $\dim(\mathsf{W}_2)=2$.

16. $\dim(\mathsf{W})=\frac{1}{2}n(n+1)$

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