

Linear Algebra 2270-4

Due in Week 3

The third week completes work from sections 1.4 and 1.5. Here's the list of problems, followed by problem notes and a few answers.

Section 1.4. Exercises 6, 8, 17, 23, 27, 31, 32.

Section 1.5. Exercises 7, 8, 10, 29, 31, 33, 35.

Some Answers and Hints

Exercise 1.4-6: On the left side of the given matrix equation $A\vec{x} = \vec{b}$, use the entries -2 , -5 in the vector \vec{x} as the weights in a linear combination of the columns of the matrix A .

Exercise 1.4-8: The answer is a matrix equation $A\vec{x} = \vec{b}$, for which A , \vec{x} , \vec{b} are given explicit definitions. The left side of the given vector equation is a linear combination of four vectors. Write the matrix A whose columns are those four vectors, and create a variable vector \vec{z} with four entries z_1, z_2, z_3, z_4 . The vector \vec{b} is the column vector on the right side of the given vector equation.

Exercise 1.4-32: A set of three vectors in \mathcal{R}^4 cannot span \mathcal{R}^4 . Reason: the matrix A whose columns are these three vectors has four rows. To have a pivot in each row, A would have to have at least four columns (one for each pivot), which is not the case. Since A does not have a pivot in every row, its columns do not span \mathcal{R}^4 , by Theorem 4. In general, a set of n vectors in \mathcal{R}^m cannot span \mathcal{R}^m when n is less than m .