# MATH 2360-D01 WEEK 1

### SECTIONS 1.1 AND 1.2; PAGES 1–24

ABSTRACT. Certain elementary operations change a system of linear equations into an equivalent one; that is, one that has the same solution set. A system of equations can through a series of such operations be turned into an equivalent one that is easy to solve using a technique known as *back-substitution.*

To facilitate this procedure, a system of equations is represented by an array of numbers, known as a *matrix.* Elementary operations on a system of equations correspond to *elementary row operations* on a matrix. To solve a system of equations, one performs elementary row operations on the corresponding matrix to bring it on *reduced echelon form*; from there it is simple to determine the solution set by back-substitution.

## SECTION 1.1

**Reading.** Make sure that you understand:

(1) The difference between a system of equations and a *solution* to such a system.
(2) The notion of a *free variable.*
(3) *Parametric* representations of solution sets.
(4) The idea of *equivalent* systems of equations.
(5) The *row-echelon form* of a system of equations.
(6) The *back-substitution* process for solving a system of equations on row-echelon form.

**Suggested problems.** To verify that you have understood the material, solve the following problems at the end of the section: 1–4, 8, 10, 13, 18, 26, 55, 61.

## SECTION 1.2

**Reading.** Make sure that you understand:

(1) What a *matrix* is.
(2) *Elementary row operations* and how they connect to the idea of equivalent systems of equations.
(3) The *row echelon form* and *reduced* row echelon form of a matrix.
(4) The *Gauss–Jordan* elimination process for bringing a matrix on reduced row echelon form.
(5) Homogeneous systems of equations and why they are always consistent.

**Suggested problems.** To verify that you have understood the material, solve the following problems at the end of the section: 1, 3, 7–11, 16, 35, 38, 55.

## APPLICATIONS

Study Example 2 in Section 1.3 and try your hand at exercises 2 and 5 in that section.

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