MATH 2360-012 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 easily solved 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, 26, 55.

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, 7–9, 16, 35, 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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