Will's Guide To Life, Volume 3

Math 124, Spring 2007

Chapter 1

Section 1.5

Linear Programming in the Plane. Know the definitions for this section. A linear function in x and y is $z = ax + by$. Lines of constancy and lines of constant revenue. For a linear function and a polygon P in the plane, maximum and minimum values of the linear function on P occur at the corner points. Linear Programming to optimize a linear function subject to constraints by first determining the feasibility region and then checking the values of the function on the corner points.

Section 1.6

Applications of Linear Programming: Know the definitions for this section. Three new types of problems, "Production Schedules," "Maximizing Revenue," "Diet Problem." These problems can all be dealt with the same way, by defining variables, and then an objective function. We then determine if we want to maximize or minimize the objective function and find our constraints (look for "at most" or "at least). Then finding corner points on which we test our objective function.

Chapter 2

Section 2.1

Row Operations and Gaussian Elimination: Know the definitions for this section. There are precisely three Elementary Row Operations: switching rows, multiplying a row by a **non-zero** constant and adding a multiple of another row to a given row. Representing a system of linear equations by an augmented matrix. The difference between a row and a column. Row Echelon Form. Using Gaussian Elimination to get a matrix into Row Echelon Form.

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Section 2.2

More on Gaussian Elimination: Know the definitions for this section. Back Substitution to get solutions to a system from a matrix in REF. Reduced Row Echelon Form (the best form). The Reduced Row Echelon Form of a matrix is unique. Multisystems, two systems of equations with the same coefficients on the variables, but different constant terms. Using matrices to solve a multisystem.

Section 2.3

Consistency of Systems: Know the definitions for this section. Consistent and Inconsistent systems. A row like $0\ \ 0\ldots\ \ 0|c$ with $c \neq 0$ being the defining characteristic of an inconsistent system in REF. Inconsistent if the corresponding system has zero solutions, consistent if the corresponding system has one or infinitely many solutions. Row Rank of a matrix, needing to be in REF to determine the row rank of a matrix. A linear system is consistent if and only if the row rank of the augmented matrix is equal to the row rank of the augmented matrix. The use of parameters for free variables when a system has infinitely many solutions. A row of zeroes or more variables than equations say that we will have to use parameters if the system is consistent.

Section 2.4

Gauss-Jordan Elimination: Know the definitions for this section. Pivoting, that is picking a non-zero entry and row operation on your matrix to make this entry, the pivot, a 1 and everything else in its column a zero. Gauss-Jordan Elimination is simply using the pivot repeatedly to get a matrix in RREF. (If we have n equations/rows, we will have to perform the pivot n times to get into RREF.)

Chapter 3

Section 3.1

Matrix Operations. Know the definitions for this section. The dimensions of a matrix tell us the number of rows and columns. An $m \times n$ matrix has m rows and n columns. Two matrices are equal if they have the same dimension and all their corresponding entries are equal. The transpose of a matrix. Matrix addition (it works as nicely as we could hope for). Multiplication of a matrix by a scalar and matrix multiplication. Being careful with the dimensions of matrices as there are matrices A and B so that AB is a matrix, but BA does not make sense. Multiplication of matrices is **NOT** commutative, $AB \neq BA$ in general. Square matrices and taking powers of a square matrix.

For more information, please go to:
http://www.math.uiuc.edu/∼wgreen4/math124.html