Outline of Math 373

1 Linear Programming

    A Linear programming problems

    B Standard form

    C Reduction to standard form

2 The Geometry of Linear Programming

    A Polyhedra

    B Review of convexity for functions $f : \mathbb{R} \to \mathbb{R}$

    C Convexity for functions $f : \mathbb{R}^n \to \mathbb{R}$

    D The convex hull

    E Piecewise linear convex objective functions

    F Problems involving absolute values

    G Extreme points

    H Polyhedra in standard form

    I Correspondence of bases and basic solutions

    J Degeneracy

    K Existence of extreme points

    L Optimality of extreme points

3 The Simplex Method

    A Development of the simplex method

    B An iteration of the simplex method

    C The simplex method for degenerate problems

    D Implementation of the simplex method

        1 Naive implementation

        2 Revised simplex method

        3 Full tableau implementation

    E Finding an initial basic feasible solution

    F The two-phase simplex method

4 Duality

    A Introduction

    B The dual problem

    C The duality theorem

    D Complementary slackness

    E Farkas' lemma and linear inequalities

5 Sensitivity Analysis

    A A new variable is added

    B A new inequality constraint is added

    C The dual simplex method

    D Changes in the requirement vector

    E Changes in the cost vector

6 Parametric Programming

7 Applications

    A Evolutionary game theory

    B Transportation problems

    C Networks