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MVE165
Applied optimization
Oral examination
Reading instructions 2008
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MVE165 Applied Optimization, 7.5 hec

Reading instructions for the oral exam (for grades 4 and 5). Chapters refer to the book by Taha. Some of the material is more thoroughly described in the book by Andréasson et al. (see the course plan).

Ch. 1–2. Some important issues: Mathematical modelling of optimization applications, graphical solution, selected linear programming applications.

Ch. 3.1–6. Some important issuses: converting inequalities to equalities, unrestricted variables, from graphical to algebraic solution of linear programs, basic and nonbasic variables– graphical and algebraic interpretation, reduced costs, the simplex method, finding an initial basis, degeneracy, unbounded solutions, alternative optima. Sensitivity analysis: changes in the right hand side and in the objective, feasibility and optimality ranges, reduced cost, shadow price.

Ch. 4. Some important issuses: Definition of the dual problem, economic interpretation of the dual, postoptimal addition of constraints and variables.

Ch. 5.1–4. Transportation models.

Ch. 6.1–4. Graph and network models.

Ch. 7.1–2. Some important issuses: Convexity, extreme points and basic feasible solutions, matrix form of the simplex method, optimality and feasibility conditions.

Ch. 7.4. Some important issuses: Weak and strong duality, complementary slackness, optimality conditions.

Ch. 9.1–9.3.1. Integer linear programming and the travelling salesperson problem.

Ch. 18.1. Some important issues: Stationary points, local and global optima, necessary and sufficient conditions for an unconstrained optimum, Newton methods (read also lecture notes and compare to Ch. 18.1.2).

Ch. 18.2.2. Karush-Kuhn-Tucker conditions for a constrained optimum (necessary and sufficient).

Ch. 19.1. The golden section method, steepest ascent/descent.

Ch. 19.2.2, 4–5. Quadratic programming, linear combinations (Frank-Wolfe) method, and the sequential unconstrained minimization technique.

Ch. 13.2.1. Decision trees (optimization under uncertainty).