Wednesday 17^{th} February, 2016 12:00

Test 1 topics

Only the E14 students need to know the proofs of the theorem marked with "(with proof)". Students in both E13 and E14 sections are required to know and understand the statement of the theorems listed. You should know how to solve the homework problems from the first four homework assignments and the first quiz.

(1) Definition: feasible solution
(2) Definition: object function
(3) Definition: optimal solution, optimum
(4) Definition: infeasible LP
(5) Definition: unbounded LP
(6) Definition: basis
(7) Definition: basic feasible solution
(8) Definition: degenerate basic feasible solution
(9) Definition: feasible basis
(10) Definition: Standard/Canonical/General form and how to transform to each form.
(11) Definition: lex positive, lex negative, lex zero
(12) Solving a 2d LP graphically
(13) Prop 1 - A feasible basis B corresponds to exactly one basic feasible solution x and x is defined by $x_B = A_B^{-1}b$ and $x_j = 0$ for all j not in B.
(14) Prop 2 - Let x be a feasible solution to an LP in standard form. x is a basic feasible solution if and only if the columns of A_k are linearly independent where $K = \{j \in [n] : x_j > 0\}$.
(15) Fundamental theorem:
Suppose LP is a linear program in standard form.
- If the LP has a feasible solution, then it has a basic feasible solution.
- If the LP has no optimal solution, then the LP is infeasible or unbounded.
- If the LP has an optimal solution, then it has a optimal basic feasible solution.

(16) Simplex method and two phase simplex method (see examples on website)
(17) $\bar{c}_j$ relative cost of column j, and the relative cost vector $\bar{c}$.
(18) Lexicographic simplex - know the row selection rule pivot rules
(19) Bland's rule - know the column and row selection rules and how to apply them
(20) Fact that lexicographic simplex and Bland's rule do not cycle
(21) Algebraic Theorem about pre-multiplication matrix and updated Tableau $\widetilde{T}$ (with proof) (see hand-out on website).
(22) Weak Duality - If x is feasible for P and π is feasible for its dual D, then $\pi^T b \leq c^T x$.
(23) Finding the dual of a linear program in general form (Definition 3.1)
(24) Strong Duality (Theorem 3.1) (with proof - can assume P in standard form)
(25) Dual of the dual is primal (Theorem 3.2) (with proof)
(26) Theorem 3.3 in book
(27) Complementary slackness (section 3.4) (with proof)