Convex Optimization and Modeling

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Exercise Sheet 2 - 05.05.2010

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Exercise 7 - Equivalent convex optimization problems

- a. (2 Points) Exercise 4.5. Derive the equivalence of problem a) and b). Note, that the first problem is unconstrained but has a non-differentiable objective, whereas the second problem has a differentiable objective but has additional constraints. Thus both methods have to be solved by quite different optimization techniques. It can happen that one problem can be solved much more efficient than the other one. Recognizing equivalent problems is a key ability in convex optimization.
- b. (5 Points) Exercise 4.11. Note again, that the minimization of the norm is an unconstrained but non-smooth problem, whereas the the equivalent optimization problems have a smooth objective but require additional constraints.

Exercise 8 - Solving simple convex optimization problems

- a. (5 Points) Exercise 4.1. Use the optimality conditions given in the lecture and/or provide reasonable arguments e.g. using the optimality results for linear programming derived in the second lecture.
- b. (3 Points) Exercise 4.8. a) and d). It often happens that one can rewrite an optimization problem and solve the minimization over some of the variables in closed form. Therefore it is important to know the solution of simple optimization problems.