Department of Mathematics, University of Houston
Dr. Ronald H.W. Hoppe
Optimization Theory, Fall 2006

Optimization Theory
(6th Homework Assignment)

Exercise 11 (*Short-Step Path Following Algorithm*)

For given $\theta \in (0,1)$, the problem of finding a value of the centering parameter σ in the short-step path following algorithm that satisfies

$$\frac{\theta^2 + n(1-\sigma)^2}{2^{3/2}(1-\theta)} \;\leq\; \sigma\ \theta\ ,$$

while maximizing the decrease in the duality measure μ for a unit step can be posed as a simple constrained optimization problem. Write down this problem. Does this problem have a solution for all $\theta \in (0,1)$? Explain!

4 Points

Exercise 12 (*Predictor-Corrector and Long-Step Path Following Algorithms*)

Consider the predictor-corrector and long-step path following algorithms. Prove that when $n = 2$, the neighborhoods $\mathcal{N}_2(\theta)$ and $\mathcal{N}_{-\infty}(1-\theta/\sqrt{2})$ are identical. Does a similar relationship hold true when $n = 3$?

4 Points

Exercise 13 (*Mehrotra's Predictor-Corrector Algorithm*)

Given a point $(x, \lambda, s) \in \mathcal{F}^o_{PD}$, show that the Δx-component of the primal-dual affine-scaling step in Mehrotra's predictor-corrector algorithm, obtained by setting $\sigma = 0$, satisfies

$$\Delta x \;=\; -\ D\ P_{Ker(AD)}(Dc)\ ,\ D := S^{-1/2}X^{1/2}\ ,$$

where $P_{Ker(AD)}$ denotes the projection onto $Ker(AD)$.

4 Points

Delivery of the homework at latest on Oct. 4, 2006, 04:00 pm. The homework may be submitted either electronically (rohop@math.uh.edu) or as a hardcopy in class