

Numerische Verfahren der restringierten Optimierung

<http://www.math.uni-konstanz.de/numerik/personen/volkwein/teaching/>

Sheet 3

Deadline for hand-in: 27.11.2014 at lecture

Exercise 7

(2 Points)

Consider the following linear program, similar to (2.1) in the lecture notes, but with new variables y :

$$\min c^\top x + d^\top y \quad \text{subject to} \quad A_1 x + A_2 y = b, x \geq 0$$

Write down optimality conditions for this problem in an analogous fashion to (2.3) and derive the functional matrix that you get in this specific case (see definition in the lecture notes, Chapter 2).

Exercise 8

Verify, that

$$r_b^{k+1} = (1 - \alpha_k^{\text{prim}}) r_b^k \quad \text{and} \quad r_c^{k+1} = (1 - \alpha_k^{\text{dual}}) r_c^k$$

holds for the steplength α_k^{prim} and α_k^{dual} , and the residuals $r_b^k = Ax^k - b$ and $r_c^k = A^\top \lambda^k + \mu^k - c$.

Exercise 9

Prove that the coefficient matrix in (2.7) is nonsingular if and only if A has full row rank.