Week 5 - Constrained Minimization (Knud)

Theory: First order optimality conditions (KKT/Lagrange multiplier method), Projection methods vs. Active set methods, SQP-method?

Literature:

Nocedal and Wright: Numerical Optimization, second edition, Springer, 2006.

- **Section 12.1-3 (pp. 313-342).**
- **? Chapter 16 and 18 ?**

In total 30 pages.

Kenny Erleben: Lecture notes on complementarity problems, unpublished, 2009, In total 29 pages.

Erleben and Engell-Nørregård: Projected Line Search Method for interactive inverse kinematics, unpublished, 2009. In total 26 pages.

Exercises:

Readings for the programming exercise:
Chapter 16.1 – 2, pages 448 – 459.
Chapter 16.4 – 5, pages 463 – 475.
Chapter 18.1 – 2, pages 529 - 535.

Programming case: Constrained Inverse Kinematics as a constrained least square fitting problem, explain the principle of joint limits.

- **Teachers**: ?
- **Students**: Extend last week exercise to include joint limits, solve the posing problem by implementing SQP method.
- Hint: Theta* = min h(theta) s.t. theta >= l and theta <= u,

  where l <= 0 <= u and

  h(theta) = 0.5 (g – f(theta))^T (g – f(theta)).

- Convince the reader that your program works.