Norwegian University of Science and Technology
Department of Engineering Cybernetics

Exercise 4
Hints

Problem 1 (50 %) Quadratic Programming

a

b

c This is a fairly work-intensive problem. It is useful to have a sketch of the objective function and the feasible area on the side to aid understanding of what is going on (copy Figure 16.3 from the textbook). Use Matlab to solve the equality-constrained QPs (16.39) numerically.

d The infimum of the Lagrangean with respect to x will in this case be the same as the minimum. It is a fairly simple problem to find the minimum of the Lagrangean. At this minimum you can find an explicit expression for x. The dual objective can then be expressed as a function of just λ (this is not strictly required). Make sure you get the constraints to the dual problem right.

e This problem involves finding an inequality of the form

$$q(\bar{x}) - q(x^*) \leq \dots \tag{1}$$

Problem 2 (50 %) Production Planning and Quadratic Programming

a

b Use the MATLAB functions `contour` and `meshgrid` to make a contour plot, like in Exercise 3. Sketch the constraints with a pen if you prefer.

c There is a fundamental difference between the solution to this QP compared with the solution to the linear problem in Exercise 3 (or any other LP).

d

e Discuss the difference mentioned in the hint to problem c).