EXERCISE 12: METHODS FOR CONSTRAINED OPTIMIZATION PROBLEMS

NICLAS ANDRÉASSON

EXERCISE 1 (the exterior point method). Consider the optimization problem to

$$\text{minimize} \quad f(\boldsymbol{x}) = \frac{1}{2}(x_1^2 + x_2^2) \tag{P}$$
$$\text{subject to} \quad x_1 = 1.$$

Apply the exterior penalty method with quadratic penalty function. □

EXERCISE 2 (the interior point method). Consider the optimization problem to

$$\text{minimize} \quad f(\boldsymbol{x}) = \frac{1}{2}(x_1^2 + x_2^2) \tag{P}$$
$$\text{subject to} \quad x_1 \leq 1.$$

Apply the interior penalty method with logarithmic penalty function. □

EXERCISE 3 (the interior point method in linear programming). Consider the optimization problem to

$$
\begin{aligned}
\text{maximize} \quad & -y_1 + y_2 \\
\text{subject to} \quad & y_2 \leq 1, \\
& -y_1 \leq -1, \\
& y_1, \ y_2 \geq 0.
\end{aligned}
$$

Apply the interior penalty method by relaxing the positivity restrictions of the slackness variables with the logarithmic penalty function. □