EXERCISE 12: METHODS FOR CONSTRAINED OPTIMIZATION PROBLEMS

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

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

Apply the exterior penalty method with quadratic penalty function. □

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

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

Apply the interior penalty method with logarithmic penalty function. □

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

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

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

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