

Algorithms for Optimal Decisions

Tutorial 3

Questions

Exercise 1 Show that the steepest descent direction

$$-\frac{\nabla f(x_k)}{\|\nabla f(x_k)\|_2} \quad (1)$$

is the solution of the constrained problem:

$$\begin{aligned} \min_d \quad & \nabla f(x_k)^t d \\ \text{s.t.} \quad & \|d\|_2^2 = 1. \end{aligned} \quad (2)$$

Exercise 2 Consider the following unconstrained problem:

$$\max_x f(x) = 2x_1x_2 + 2x_2 - x_1^2 - 2x_2^2. \quad (3)$$

Find its solution using the steepest ascent method starting from the point

$$x^{(0)} = (x_1^{(0)}, x_2^{(0)}) = (0, 0).$$