

Algorithms for Optimal Decisions

Tutorial 9

Questions

Exercise 1 Using the Goldstein–Levitin–Polyak algorithm solve the following NLP problem:

$$\begin{aligned} \min_x \quad F(x) &= x_1^3 + x_2^2 - 3x_1 - 4x_2 \\ \text{s.t.} \quad h_1(x) &= x_1^2 + x_2 - 1 \leq 0 \\ h_2(x) &= -x_1 \leq 0 \\ h_3(x) &= -x_2 \leq 0. \end{aligned} \tag{1}$$

Starting point : $x^{(0)} = (x_1^{(0)}, x_2^{(0)}) = (\frac{1}{4}, \frac{1}{4})$.

Exercise 2 Using the Goldstein–Levitin–Polyak algorithm solve the following QP problem:

$$\begin{aligned} \min_x \quad F(x) &= 2x_1^2 + x_1x_2 + x_2^2 - 12x_1 - 10x_2 \\ \text{s.t.} \quad h_1(x) &= x_1 + x_2 - 4 \leq 0 \\ h_2(x) &= -x_1 \leq 0 \\ h_3(x) &= -x_2 \leq 0. \end{aligned} \tag{2}$$

Starting point : $x^{(0)} = (x_1^{(0)}, x_2^{(0)}) = (1, 1)$.