SoSe 2020
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Optimization and Data Science
3. Homework exercises

Theoretical exercise 1:
Examine the following function regarding minima and maxima.

$$f : \mathbb{R}^2 \to \mathbb{R}, f(x, y) := (e^x + y)y - x^3$$

Theoretical exercise 2:
Examine the following function, called Roosenbrock function, regarding minima and maxima.

$$f : \mathbb{R}^2 \to \mathbb{R}, f(x, y) := 100(y - x^2)^2 + (1 - x)^2$$

Theoretical exercise 3:
Examine the following function, called Bazaraa-Shetty function, regarding minima and maxima.

$$f : \mathbb{R}^2 \to \mathbb{R}, f(x, y) := (x - 2)^4 + (x - 2y)^2$$

Theoretical exercise 4:
Examine the following function regarding minima and maxima.

$$f : \mathbb{R}^2 \to \mathbb{R}, f(x, y) := x^2 - 2xy + y^2$$

Programming exercise 1:
Implement and visualize the Roosenbrock function and the Bazaraa-Shetty function and mark their minima in the visualization. (You can use your minima calculated by hand. Your program does not have to calculate them itself.)

Silvester's criterion might be useful for solving the theoretical exercises.

The solutions of the theoretical exercises will be discussed on 27. April 2020.