

Homework 9: Optimization (without constraints) of functions of several variables

To submit: on Saturday, 28.05.2022, 9:00 a.m., online by the learning campus

Exercise 1 (5 pts.)

Compute all stationary points of

$$f(x, y) = y^2(x - 1) + x^2(x + 1).$$

Classify whether the stationary points are minima, maxima, or saddle points!

Exercise 2 (3 pts.)

Show that the sufficient condition (of second order) for a minimum is not necessary.

Give a counter-example by considering the function

$$g(x_1, x_2) = x_1^2 + x_2^4.$$

Exercise 3 (6 pts.)

Consider the function

$$h(x, y) = x^2y^2 + (x^2 - 1)^2.$$

Which information do you obtain on local minima and maxima of h by the necessary (1st order) condition and by the sufficient condition?