

Exercise 5 – Constrained problems

The test function for this exercise will be the Flower function (you can find the MATLAB implementation in folder for this seminar). The constraint will be

$$x_1^2 + x_2^2 \geq 2$$

Your job is to program four methods for optimization of the constrained Flower function, namely:

- A direct method of your choice with the count penalty function, $\rho = [0.5, 1, 5, 10]$.
- A stochastic or population method of your choice with the count penalty function, $\rho = [10]$.
- The BFGS Quasi-Newton method with the quadratic penalty, $\rho = [0.01, 0.5, 1, 4, 8, 16]$
- For a modified problem, where the inequality constraint is changed into equality:

$$x_1^2 + x_2^2 = 2,$$

the BFGS Quasi-Newton method with the Augmented Lagrange Method.

As the starting point set $x^{(0)} = [-2, -2]^T$ and set parameters of the chosen methods and the termination criteria in such a way as to guarantee success (at least with high probability). Visualize the iterations.