Exercise 6 – Simulator

In folder for this seminar you will find a simulator script (`simulator.m`). This simulator takes as input 10 values (that characterize the simulated system) and outputs a vector of four values ([power, area, recovery, purity]). You can look at a visualization of the simulated system in the script `visualize.m`.

Your job is to write a method that will find the optimal configuration of the input parameters that minimize the power (first coordinate of the output of the simulator), subject to the following constraints:

- The input values (variable values) must lie between lower bounds and upper bounds (please beware that if you try to input values outside of these bounds, the simulator might not work at all):

  $lb = [2, 0.501, 5, 2, 0.501, 5, 2, 0.501, 100, 100]^T, \quad ub = [200, 5.499, 100, 200, 5.499, 100, 200, 5.499, 500, 500]^T.$

- The area (second coordinate of output of the simulator) should be less than 30, i.e., between [6,30] (the 6 comes from the lower bounds).
- The recovery (third coordinate of output of the simulator) should be less than -95 (this output is negative), i.e., between [-100,-95].
- The purity (fourth coordinate of output of the simulator) should be less than -97 (this output is also negative), i.e., between [-100,-97].

As the starting point you may set the values proposed in script `cv7.m` (but you can choose whatever starting point you like). Beware that even if you input into the simulator values within the prescribed bounds, the output might be ∞ (i.e., the model is not feasible). Your method should be able to deal with this.

The choice of the method is up to you (my advice is to use some stochastic method with appropriate penalties for the constraints, but you can use whatever you like). Set the parameters of the method in a way that it will terminate in (roughly) one minute (on your machine).