Optimization methods m 5770-001 /6640-001

HW 6

November 14, 2016

1. Write a code for Nelder-Mead method. Use http://www.scholarpedia.org/article/Nelder-Mead_algorithm. Test the code by minimizing

$$f(x) = x_1^2 + x_2^2 + x_1x_2 + x_1x_3 + x_3^2$$

2. Test Nelder-Mead method, a quasi-Newton method, and a conjugate gradient method minimizing the following functions: (see https://en.wikipedia.org/wiki/Test_functions_for_opti

   2a. Beale's function

$$b(x, y) = (1.5 - x + xy)^2 + (2.25 - x + xy^2)^2 + (2.625 - x + xy^3)^2$$

   2b. Rosenbrock function, n=4

$$f(x) = \sum_{i=1}^{n-1} \left[100(x_{i+1} - x_i^2)^2 + (x_i - 1)^2\right]$$

   Compare the results obained by these methods.

3. Using Lagrange multipliers method, find

$$\min_{x \in R^n} \left(\sum_{i=1}^{n} a_i^2 \, x_i \right) \quad \text{subject to a constraint:} \quad \sum_{i=1}^{n} \frac{1}{x_i - c} = \frac{1}{b}$$