

# Optimization methods. Fall 2016. HW-2

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Due day: Thursday, September 15

Minimize the functions

$$f_1(x_1, x_2) = (x_1^4 + x_1^2 + x_2^2 + 1.2x_1(x_2 + 1)^{1.4} + 1)^{0.7} \quad (1)$$

$$f_2(x_1, x_2) = x_1^2 + 9x_2^2 + 6x_1x_2 + .3x_1^4 \quad (2)$$

$$f_3(x_1, x_2, x_3) = x_1^2 + 100x_2^2 + 10x_3^2 - 15x_1x_2 + 2x_2x_3 \quad (3)$$

by

1. Steepest descent method (justify the choice of the step length, check Wolfe conditions)
2. Newton method, if it is applicable.
3. Modified Newton method

Start from the points  $[1, 0]$  and  $[1, -1]$ . Compute four iterations. Discuss your choice of parameters and compare results obtained by these algorithms. Use scaling if needed.