IE 440 Fall 2019 - Nonlinear Models in Operations Research

Homework # 5

due December 9^{th}, Monday, 23:55.

Consider the following problem:

$$\begin{aligned} \min \quad & f(x_1, x_2) = 3x_1^2 + 2x_2^2 - 2x_1x_2 - 4x_1 + 2x_2 + 3 \\ \text{s.t.} \quad & x_1 + x_2 + x_3 = 2 \\ & x_1 + x_2 + x_4 = 5 \\ & 2 \leq x_1 \leq 5 \\ & -1 \leq x_2 \leq 6 \\ & 0 \leq x_3 \leq 4 \\ & 0 \leq x_4 \leq 10 \end{aligned}$$

You are asked to solve this NLP using Reduced Gradient Method.

- Use Golden Section to determine the step length. You may take the parameter set (ϵ_2, a, b) as (0.005, -1000, 1000).
- For the remaining parameters (ϵ_1,$x^{(0)}$) select two different sets of values, and repeat your computation for these two sets.

Your output should be in the following format:

Solution for Reduced Gradient Method :

k	$x^{(k)}$	$f(x^{(k)})$	$d^{(k)}$	$\alpha^{(k)}$
0	...	...	...	...
1	...	...	...	...
...				

$x^* = ...$
$f(x^*) = ...$

If, somehow, any of the algorithms lasts longer than 20 iterations, you are supposed to report only the first 5 and the last 5 iterations.

Include the screen shots of your outputs and your source codes in your report. Also submit the soft copy of your report and the source code which are named as **HW5-GroupID** to moodle.