Homework # 3

due December 3th, Friday, 23:59.

Consider the following function:

$$f(x_1, x_2) = (5x_1 - x_2)^4 + (x_1 - 2)^2 + x_1 - 2x_2 + 12$$

You are asked to find the minimum of this function using:

- Cyclic Coordinate Search

- Hook & Jeeves Method

- Simplex Search

For Cyclic Coordinate Search and Hook & Jeeves Method:

- Use an exact line search method to determine the steplength. You may take the parameter set (ϵ_2, a, b) as (0.005, -100, 100).

- For the remaining parameters $(\epsilon_1, x^{(0)})$ select two different sets of values, and repeat your computation for these two sets.

For Simplex Search:

- Similarly, select two sets of initial points (of size $n + 1$), and repeat your computations.

- The reflection, contraction and expansion coefficients (α, β, γ) are suggested to take values $(1, 1/2, 2)$ respectively. You may experiment freely with these coefficients.

Your output should be in the following format:

Solution for Cyclic Coordinate Search:

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

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

Solution for Hook&Jeeves Method:

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

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

Solution for Simplex Search:

Iteration	$\bar{x}$	x_h	x_l	x_{new}	$f(x_{new})$	type
0	...	...	...	...	...	...
1	...	...	...	...	...	...
...						

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

The new point entered into the basis may be created by reflection, expansion or contraction. In order to designate between them write R, E, or C under the type column.

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 **HW3-GroupID** to moodle.