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Problem set 7

1. You can use Genetic Algorithm in any way (developing a code, using a prepared code or using MATLAB Toolbox) to model and optimize any problem that is interesting to you.

or

Optimize *one* of following problems using GA in any way:

a) minimize

$$Z = 3(1-x)^2 \times exp(-x^2 - (y+1)^2) - 10\left(\frac{x}{5} - x^3 - y^5\right) \times exp(-x^2 - y^2) - \frac{1}{3} exp(-(x+1)^2 - y^2)$$

b)
Find the minimum of: $f(x, y) = x\sin(4x) + 1.1y\sin(2y)$
Subject to: $0 \le x \le 10$ and $0 \le y \le 10$

Select and solve <u>one</u> of following problems (I'll be more than happy if someone does more):
(It is recommended that implementing a code or software to solve)

2. Find the minimum of the following function using simulated annealing:

$$f(X) = 6x_1^2 - 6x_1x_2 + 2x_2^2 - x_1 - 2x_2$$

Assume suitable parameters and show detailed calculations for 2 iterations.

3. Find the minimum of $f = x^5 - 5x^3 - 20x + 5$ in the range (0, 3) using the ant colony optimization method. Show detailed calculations for 2 iterations with 4 ants.

4. Find the maximum of the function $f = -x^5 + 5x^3 + 20x - 5$ in the range $-4 \le x \le 4$ using the PSO method. Use 4 particles with the initial positions x1 = −2, x2 = 0, x3 = 1, and x4 = 3. Show detailed calculations for 2 iterations.

"Nothing is too wonderful to be true if it be consistent with the laws of nature."
Michael Faraday