Exercise 5 FYSA120 C++ numerical programming Winter 2015

PROJECT
Email the *commented* solution code (*.cpp, *hpp) as attachments to : `fysy160(at)gmail.com` **Subject line:** `Project`

1. A simple genetic algorithm, written by John Burkardt at the Florida State University, is in the file `simple_ga.cpp`. Sample input/output files are `simple_ga_input.txt`, and `simple_ga_output.txt`.

   - Compile and run the code and check that you get the expected result.
   - Write a short description of how a genetic algorithm works in this code
   - Modify the code to *minimize* the function

     $$f(x_1, x_2, x_3) = (x_1 - 1)^2 + 2(x_2 - 2)^4 + 3(x_3 - 3)^6 \ ,$$

     which has minimum $f(1, 2, 3) = 0$. Notice that the algorithm *maximizes* the fittness, so f is not a good fittness function. The code works only for positive fittness values, so try, for example, to maximize $(100 - f)$. Remember to set appropriate variable search ranges in the input file.
   - Find the maximum of the function (plotted in the figure below)

     $$f(x) = 2 + 1/((x - 0.2)^2 + 1.0)\sin(1/x), \quad 0 < x \leq 0.3 \ .$$