FunWork #3

Due on March 07

INSTRUCTIONS: The assignment must be typed. Clearly identify the steps you have taken to solve each problem. Whenever you use somebody else's code from the Internet, make sure to give reference/credit to the code source. If you do not reference the source and the grader will find the source, you will be charged with plagiarism, which is a serious offense.

Your grade depends on the completeness and clarity of your work as well as the resulting answer.

Submissions via e-mail will not be accepted!

Consider the Rastrigin function,

$$f(x_1, x_2) = 20 + \left(\frac{x_1}{10}\right)^2 + \left(\frac{x_2}{10}\right)^2 - 10\left(\cos\left(\frac{2\pi x_1}{10}\right) + \cos\left(\frac{2\pi x_2}{10}\right)\right).$$

Minimize Rastrigin's function using

1. the steepest descent algorithm;

2. the Powell conjugate gradient algorithm, see page 188 in the textbook for the description of the algorithm;

3. the rank one correction algorithm;

4. the DFP algorithm;

5. the BFGS algorithm.

Connect the successive points with lines or lines with arrows to show clearly the progression of the optimization process. Use two starting points,

$$\boldsymbol{x}^{(0)} = \begin{bmatrix} 7.5 \\ 9.0 \end{bmatrix} \quad \text{and} \quad \boldsymbol{x}^{(0)} = \begin{bmatrix} -7.0 \\ -7.5 \end{bmatrix}.$$

In each run, locate the obtained sequence of points on the level sets of f.

Use the Fibonacci line search algorithm to determine the step size. Other line search algorithms will not be accepted.