

AMSC 607 / CMSC 764 Fall 2003

HMWK 2

Show all work.

All work must be your own (i.e., no group efforts are allowed).

If you use a reference book, cite it, or you will lose credit!

Due: Nov 11.

In this assignment, you will compare the performance of various algorithms for unconstrained optimization.

1. (15) Study the documentation for the Matlab program `fminunc`, used in Homework 1. (Find it at <http://www.mathworks.com/>) Note that there are many minimization algorithms implemented in this single routine, including steepest descent, BFGS, DFP, etc. Give a concise summary of these various options, including directions on how to force the program to use each of them.
2. (10) When `fminunc` uses BFGS, how is the direction computed: by factoring the matrix, updating the inverse, or updating the factorization? How did you determine this? (Look at the code if necessary. Do not contact Mathworks.)
3. (25) Implement the BFGS method using updates of the LDL^T factorization of the approximation matrix B . See Gill, Murray, and Wright, pp. 42-43 for the update algorithm. (Handout in class on 10/28.) Compare your implementation, using a good linesearch algorithm, to `fminunc`'s BFGS, steepest descent, finite difference Newton, and truncated Newton algorithm; count function evaluations, gradient evaluations, and time. Use the four test problems provided. Discuss your results and draw conclusions about the advantages and disadvantages of the different algorithms.