

AMATH/MATH 516

PROGRAMMING ASSIGNMENT GUIDELINES

1. You may use any machine at your disposal. However, you must program in MATLAB.
2. The program should be well documented and written in modular form. All output should be clearly labeled for ease of reference.
3. The interpretation of the numerical output will count for 50% of the grade on the computing projects. That is, you must observe and explain what happened in your numerical experiments in light of the theory we have studied. If your experiments suggest a theoretical result, then try to formulate the result and prove it. If the basic numerical experiment suggested in the problem indicates that more experimentation of perhaps a different type might yield further insight, then formulate these experiments and implement them.
4. Turn in the write-up of your interpretations, your program output, and your program listings (in that order), attached together, by the beginning of class on the due date. Please separate the pages of the computer output and trim your output down to 8 and $\frac{1}{2}$ by 11. (Plan for this as you format your output. A good technique for analyzing the behavior of an algorithm is to use a "data" matrix to store all the pertinent iteration data and then graph this data at termination.) Some points to consider follow:
 - (a) Graphs illustrating the points raised in your interpretation are helpful. They are helpful both in the discovery and explanation of numerical phenomenon.
 - (b) The choice of appropriate stopping criteria is of fundamental importance. At the very least you must have conditions associated with
 - i. preventing a run away algorithm,
 - ii. stalling, i.e. the difference between successive iterates is *very small*, and
 - iii. an optimality condition being *nearly* met.
 - (c) Understanding the role of the various parameter settings in the program is always essential to understanding the behavior of the method. Especially those associated with the stopping criteria. Graphing the behavior of the algorithm with respect to perturbations in these parameters can provide insight.
5. Please start early and leave time to interpret your results. Be creative.