

Your task for this project is to write a brief paper which answers the given questions and illustrates the fundamental ideas in clear, concise, descriptive English prose. The report should separate the required tasks of the given project and document each in the appropriate section, i.e. Analysis, Computer Program, or Results.

1. Analysis (30%). This section should begin by stating all the problems posed in the handout. This can be accomplished in your own words or simply by using the handout as the cover sheet to your report. Next, derivations and mathematical proofs necessary to solve the given problems or to create the required programs should be documented. Then, a brief description of all algorithms you plan to use in your code should be given. The notation used to describe the algorithms should be consistent with the variable names and internal documentation of your programs. The last part of analysis should be a discussion of numerical considerations for the algorithms you have just described. Proofs of convergence, predicted error bounds, predicted number of iterations, etc., are examples of these considerations. They are discussed in the text or may be explained in class. If the given algorithms allow you to predict their performance before the actual computer run, then these facts and predictions should be documented.

2. Computer Program (30%). The source code should be readable and printed with margins by a printer in good working order. Internal comments should describe algorithms and variables, relating them to those described in your Analysis section. Next, this section should describe the input and output to and from your code. Some students go too far with this by showing the hand input of data to their runs—this is not necessary. A simple echoing of the data in some tabular form will suffice, as long as it is clear to the reader that you are starting with the correct initial data. Also, remember to use double precision variables for all real calculations. If your programming language does not have this, now is the time to find one that does. Ten percent of the points for your program will be for your programming style. If you have bugs in your program, do not expect them to be found during the grading process, rather come to the TA office hours for assistance. However, you should always first make significant efforts to find errors yourself, including careful code traces by hand, and you should have the results of your attempts (including printouts of variable values at different steps) available for inspection.

3. Results (30%). This section contains the output of your program and an explanation of the results. Explaining your output should include comparing the results to the predictions (if any) in Analysis along with appropriate comparisons between the performance of different methods used and/or cases solved. If the method did not solve a given problem, explain why. If it did work, explain why these results match predicted values or are within predicted error bounds. Many students

simply report in their own words the numbers from the computer output- this is not an explanation! By getting this far in the project you have covered the analysis, programmed the code, and probably run your code many times while debugging it for all the given cases. Now is the time to step back from the problem and look for patterns or comparisons in the results, and, if possible, use the information in the Analysis to explain your observations. Use your intuition and experience to make the strongest mathematically certain statements you can about the methods used applied to the given problems.

Any English course has a minimum standard for quality of written expression of ideas, and you would not consider handing in a rough draft as a final copy. The same holds true here in Math 128. Not only are you expected to understand the given project and program it correctly, but you are also required to express this through your report in clear, concise, and readable English or math notation. The projects are more than a homework assignment with a printout attached-they are a document of all of your work and understanding of the problems posed. Your report should stand on its own, documenting every aspect of the project in the context of material taught in the course. For this reason Style amounts to 10% of the total points for the project.

Incomplete problem solutions will NOT be accepted for credit.

In order to receive full credit for an assignment, it MUST be completed and turned in by classtime on the specified due date.

Any assignment turned in late, but on or before the absolute due date (typically the following class period) will receive a maximum of one-half credit.

Any assignment turned in after the absolute due date will not be graded and no credit will be given for it.

Start Early