Mean-Median Project
Math 242
due Friday, March 6

The goals of this project are to investigate claims made in the paper Chamberland and Martelli, and to investigate your own conjectures. The Chamberland and Martelli paper is available at the following address:

> http://www.math.grin.edu/~chamberl/papers/mean_median.pdf

For this project, do the following:

1. Demonstrate the result of Theorem 2.1, that the sequence of medians is monotone, for various initial sequences. Plots are helpful for this.

2. Provide evidence for the Strong Terminating Conjecture, as stated in the paper. Do you think this holds for starting sets of different sizes?

3. The authors claim "numerical investigations suggest that the number of steps needed until the limiting median is attained is an unbounded function." Provide your own numerical evidence for this.

4. Make at least two of your own conjectures related to the mean-median map, or about things that you have noticed during this investigation. Provide some numerical evidence for your conjectures.

Present your work in a Mathematica notebook. As usual, your Mathematica notebook should indicate not only what you computed, but also how well you understand what you did. A list of calculations with no reasoning will not suffice. Your goal should be to communicate your solution to another person (e.g., another student at your level who is not in this course).

Only submit code that actually runs. If you can't get something complicated to work, try something simpler. It's better to turn in an incomplete assignment that runs instead of a "complete" assignment that doesn't run.

Your notebook will be graded on a scale of 0 to 16 points. The following rubric gives characteristics of notebooks that will merit sample point totals. (Interpolate the following for point totals that are not divisible by 4.)

16 points. Problems and goals are clearly stated, including relevant definitions or parameters. Computations are complete; code runs and is clearly explained. Conclusions are clearly stated and backed up by sufficient computational evidence. Limitations of the methodology, extensions for future work, and conjectures are discussed. Notebook is well-formatted and easy to read.

12 points. Problems and goals are stated well, though relevant definitions or parameters may be missing. Computations are mostly complete; code runs, but explanation is weak. Conclusions are unclear or not well justified. Insufficient discussion of limitations, extensions, and conjectures.

8 points. Statement of problem or goal is unclear. Computations are incomplete; explanation is ambiguous. Code may produce errors when run. Conclusions are possibly correct, but not justified. Little or no discussion of limitations, extensions, or conjectures. Notebook is difficult to read.

4 points. Serious misunderstanding of the problem or goal. Computation is inadequate for the task at hand. Work is not clearly explained. No discussion of limitations, extensions, or conjectures. Notebook is difficult to read.

0 points. Notebook is not turned in.