Final Project Guidelines

Your final project is to write code that solves an interesting PDE, describe how you solved the equation, and use the code to calculate solutions. You will be submitting:

1. The code used to solve the equation.
2. A report describing how you solved the PDE, and several examples.
3. A short presentation to the rest of the class during the last week of class.

You must select a PDE and have it approved by me by Nov 1st. If you need ideas for a PDE, ask me!

You will be working in groups of 2 or 3 to solve a PDE. You should write the code together, using the "pair-programming" technique. When doing this remotely, the idea is that one person will be editing the code, and they should share screen with the others. The "observers" are there to help catch any bugs, and also think about the broader structure of the code. The code written in groups is often much higher quality than code written individually. This is because we often like to take shortcuts when trying something out ourselves, but if someone else is watching, they should say that they don't understand how something works, and you can discuss the issue further. This generally leads to better code and fewer bugs. You can read more about this by reading the Wikipedia page, or searching for articles about pair-programming.

As part of the code, you will be submitting:

- The code used to solve the PDE.
- Scripts you used to run all the examples in the report, as well as any analysis or plotting scripts you used.
- Documentation of how the code works, so someone else could easily solve the same PDE with minor modifications, e.g., different initial conditions. The documentation should also describe how the simulations included in the report were run, and how they were analyzed/visualized.

In addition to solving the PDE, you will also write a report describing your work. This should include:

- Discussion of the motivation behind/derivation of the PDE, and why it is interesting.
- Description of the numerical method used to solve the equation, and why that method was chosen.
- Verification of the algorithm: You should show that you reproduce a well-known or simple solution, and also show that your code converges to that solution in the expected way.

- Example simulations, together with a description of the phenomenon they depict.

You only need one report per group, and I encourage everyone to contribute to putting together the report.

Finally, you will be presenting the projects to the class the week of Dec 2nd. You should prepare a 10 minute presentation summarizing your report. This is a good opportunity to show movies of your simulations. There will be a few minutes of questions from your classmates or myself after each presentation.

The code and report are due at the beginning of class on Dec 2nd.