MAE 107: Numerical Methods

Objective: You will develop the ability to devise efficient numerical algorithms. In addition to learning some standard algorithms, you will develop a sense of the important issues that arise when one needs to numerically solve a problem. Of course, you may also sharpen your coding skills.

Grading: [The following is tentative, and we reserve the right to make small changes during the first few weeks.] The final course grade will be calculated as follows:

Homework: 28%
Quiz 1: 21%
Quiz 2: 21%
Quiz 3: 21%
Take-Home Final: 9%
Class Participation Modifier: ±2%
(Typically, the overwhelming majority have 0% modification;
it is extremely rare to have a negative modifier.)

∘ Homework will be due at the time indicated on the assignment. Homework handed in up to two hours late will still be accepted but with a loss of 20% of that homework grade. **The policies regarding due time are strict.**

∘ Because of staffing limits, it is possible that not all homework problems will be graded.

∘ One homework assignment grade (that with the lowest percentage) will be dropped.

∘ The overall grade for the homework portion of the class will be computed simply by summing the non-dropped homework scores. For example, with four assignments receiving grades of 45/50, 39/40, 50/100 and 68/70, the overall homework grade would be 152/160 (i.e., 95%).

∘ As always, although you may discuss problems together, **the work you hand in (including your codes) must be clearly your own.** This has occasionally led to difficulties in the past, so please take care.

∘ The homework assignments will require both numerical analysis and software implementation.

Content: We will study the most common basic problems that are solved numerically. These standard problems are ubiquitous throughout engineering applications. They include root-finding (finding solutions of equations), interpolation, integration, solution of ODEs (ordinary differential equations), linear systems, etc. These are standard problems, but the issues that arise in the development of the associated algorithms are issues that will be important in many problems that you will encounter as an engineer. Throughout, we will emphasize the core issues that one needs to be concerned with rather than the simple regurgitation of recipes.