Prof. Ming Gu, 861 Evans, tel: 2-3145
Office Hours: MWF 1:30-3:00PM
Email: mgu@math.berkeley.edu
http://www.math.berkeley.edu/∼mgu/MA128AFall2017

Math128A: Numerical Analysis

Programming Assignment #2
Due Nov. 29, 2017

In this project, we will calculate the trajectories of a mini solar system consisting of the Sun, Mercury, Earth, and the Moon. The motion of celestial bodies is governed by Newton's second law of motion and gravity. The program `SunEarthMoon.m` on the class website simulates the orbits of the Sun, Earth, and the Moon. Modify this program to include the motion of Mercury as well. You need to research and code in the right mass/distance/velocity parameters for Mercury in order for this simulation to work.

For Programming Assignment #2, you should turn in a .m file SunEarthMoonxxx.m where xxx is your student id.

- You should reformulate the system of second order ODEs into a system of first order ODEs, and solve the system with the matlab function `ode45`.
- Your program should take the same input arguments *years* and *framerate*.
- Your program should produce
  - a plot depicting the orbits of the Moon, the Earth, and the Sun.
  - a plot depicting the orbits of the Earth, Mercury, and the Sun.

Programming Assignment #2 is due at 23:59PM on Nov. 29, 2017.