

COMPUTATIONAL PROBLEM RELATED TO PLANETARY MOTION

(due date is flexible but it is wise to hand in the material by 4/6/18 or thereabouts for the first part)

- 1) (minimum but remember: counts for 10% of the final grade) Compute and display the motion of a planet around the sun with the units for masses and time discussed in class.
 - a) By using the coordinates r, ϕ discussed in class.
 - b) By using coordinates x, y .

In both cases do the calculation first with the initial conditions discussed in class. Make sure you vary the step size for the time variable to explore the accuracy of the calculation and compare your result graphically with the exact solution for the shape of the orbit. In addition, you should vary the initial conditions to generate other possible orbits like circles and hyperbolas and illustrate these with graphs accordingly.

- 2) (additional credit to compensate for points missed on the Midterm or Final) Solve the problem for the motion of two planets around the “Sun”. You may assume that both planets move in the same plane. One should be an Earth and the other a Jupiter like planet. Use appropriate initial conditions for “Earth” and “Jupiter” and compare the resulting “Earth” orbit to the one found without “Jupiter”. Ensure that “Jupiter” has an appropriate impact on the motion of “Earth”. Alternative to this version is to describe a “Sun”, “Earth”, and “Moon” system with the “Moon” going around “Earth”. Additional project elaborations and extensions are clearly possible and will be awarded at an appropriate level. You could think of making a movie for example...