Homework 6 Astr 400B

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Question 1: Create a plot of your predicted M33 orbit from to = 0 Gyr to tmax = 10 Gyr. Start with 0.5 Gyr intervals for Δ t and refine (for example, to 0.1 Gyr) once you know the code is working. Overplot the solution to Assignment 6 for M33's orbit with respect to M31 from the simulation. Do this for both the total position and total velocity as a function of time.

Solution: I have uploaded my plots for t= 10 Gyr in the repo.

Question 2: How do the plots compare?

Solution: The previous plots had many close encounters and this plot has only one close encounter.

Question 3: What missing physics could make the difference?

Solution: The biggest missing physics is, that we have not included the effects of dynamical friction. The dynamical friction is one which eventually leads to merger of galaxies. So, their should also be an equation for dynamical friction in the simulation.

Question 4: The MW is missing in these calculations. How might you include its effects?

Solution: The mass of MW is comparable to the mass of M31, and so, it also has strong gravitational potential on M33 so, we should also include an equation for MW potential on M33. In the leap frog function, at equation 8 we should include an equation for acceleration due to MW as well.