Ay190 – Final Project – README
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The infrastructure of the code is contained in two python codes. The rest of the python files use those structure code to compute and produce figures. All figures are compiled into a LaTeX writeup, `Final_Project.pdf`

Structure:

- `Integrator.py`: The code contains function that performs numerical integration by both RK4 and Leapfrog methods.
- `Project_Lib.py`: It is a function library containing function that calculate total energy of the system, distance between Earth and Moon, and eccentricity of the moon.

Python code used to create figures. The following list is arranged by the order appeared in the writeup.

- `Figure_Error_Accumulate.py`: Produces figure 1 in the writeup. Create figures showing that the RK4 method accumulates error while the LF method doesn't.
- `Figure_Error_Convergence.py`: Produces figure 2 and 3 in the writeup. The first figure shows error evolution of RK4 with different time step. The second figure shows convergence of error.
- `Figure_Error_AddedEccen.py`: Produces figure 4 in the writeup. Creates figure that shows error in energy of circular and elliptical orbit, with the same size of time step.
- `Figure_Add_Moon.py`: Produces figure 5 and 6 in the writeup. The first figure shows the distance between Earth and Moon over time. We can see how the perigee and apogee varies over time. The second figure measures eccentricity of the moon for each orbit.
- `Figure_Kozai_VaryingEcc.py`: Produces figure 7 in the writeup. Setting the moon with initial inclination of 45 degree to the Earth-Sun orbital plane. The code produces figure that observe moon eccentricity.
- `Figure_Kozai_MaxEcc.py`: Prodcues figure 8 in the writeup. Creates figure showing maximum eccentricity achieved from several initial inclination angle. Taking long time to run, since I use large number of time step.