

Lab 1

PHY407

September 13, 2022

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Work Breakdown

We worked/talked on/about all parts, but some more than others:

- **Sam** worked on Q1.py
 - **Lucas** worked on Q2.py, myFunctions.py
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Question 1

(a) Nothing to submit

(b) Pseudocode:

- Initialize position arrays (x , y) and velocity arrays (v_x , v_y) along with the initial conditions
- Loop for 10^4 steps and integrate equations using the Euler-Cromer method
- Plot the position of Earth in (x , y) space and velocity components (v_x , v_y) with respect to time

The equations used in the Euler-Cromer integration are as follows:

$$v_{x,i} = v_{x,i-1} - \frac{GM_S x_{i-1}}{(x_{i-1}^2 + y_{i-1}^2)^{3/2}} \Delta t \quad (1)$$

$$v_{y,i} = v_{y,i-1} - \frac{GM_S y_{i-1}}{(x_{i-1}^2 + y_{i-1}^2)^{3/2}} \Delta t \quad (2)$$

$$x_i = x_{i-1} - v_{x,i} \Delta t \quad (3)$$

$$y_i = y_{i-1} - v_{y,i} \Delta t \quad (4)$$

Question 2

Question 3