

Quick Tour

Exercise 3

Program Outline

- Read a and P from file
- Compute $\log(a)$ and $\log(P)$
- Plot the data and label the graph
- Fit a polynomial (degree = 1)
- Compute the mass of Jupiter
- Display the result for slope and mass

I used a text editor to create a file called `moons.txt` with values of P and a for each moon.

The slope m of the fit should be $\frac{3}{2}$. The intercept b of the line is

$$b = \log\left(\frac{2\pi}{\sqrt{GM}}\right).$$

Solve this equation for the mass of Jupiter M .

$$M = \frac{4\pi^2}{G} 10^{-2b}$$

The program `exercise3.py` used the above equation to find the M once the intercept b was determined from the fit. It was written by modifying `findg.py`. Running the program gives $m = 1.4998$ which is close to the theoretical value of $3/2$. It gives $M = 1.88 \times 10^{27}$ kg which is close to the accepted value of 1.899×10^{27} kg.