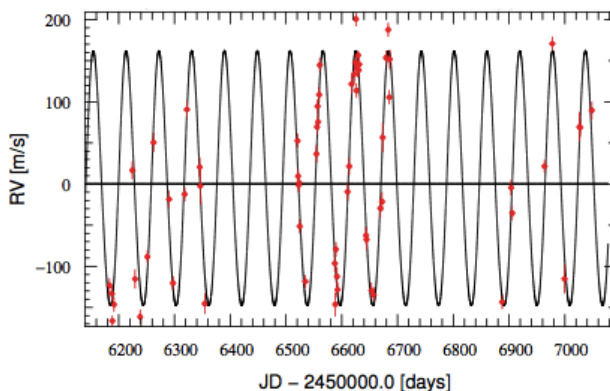


PYTHON ACTIVITY

1. Use your chromebook to find the python files as follows:
 - (a) Connect via wifi to Guest-Northwestern
 - (b) Open the browser and go to <https://exoplanets.rcs.northwestern.edu>
 - (c) For the username/password, enter the one on the strip of paper you got. (You won't need that strip again, but don't give it to someone else or you will be overwriting each other's files).
 - (d) Click on the file exo1.ipynb.
2. Work through the example notebook exo1.ipynb that simulates Jupiter and the Sun, and use it to answer the following:
 - What is Jupiter's orbital period?
 - What is the maximum speed of the Sun due to Jupiter?
3. This figure shows recent radial velocity (RV) measurements of a star.

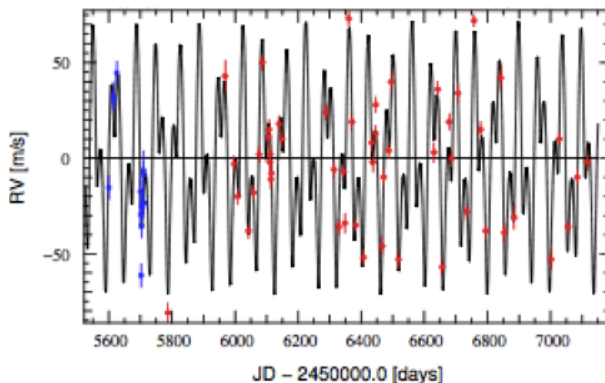


The red points are the measurements, the black curve is to guide the eye, and the x-axis is the date in days.

- What is the mass of the planet (measured in Jupiter masses)?
- How far is it from the star (measured in AU)?

To answer this, start from exo2.ipynb, which is the same as exo1.ipynb, but with the extra comments removed. Modify that code by changing the mass and location of Jupiter until your curve looks similar to the one in the figure. Your answers don't have to be exact—they can be within around 10%. Note: to see the period more clearly, make the simulation last shorter than 20yr.

4. **BONUS QUESTION:** Repeat question 2, but now for the following 2-planet system.



- How far are the two planets from the star? To make it easier, I'll tell you the masses of the two planets: 0.43 Jupiter masses for the inner one, and 0.78 Jupiter masses for the outer one.

Start from exo3.ipynb, which is the same as exo1.ipynb, but with the extra comments removed.