

# Astron 98 Final Report

Leif Giardino

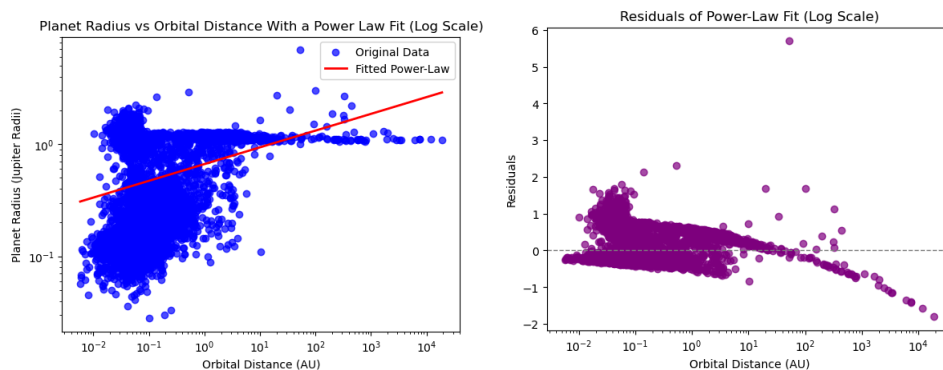
## Relation Between Orbital Distance and Planet Radius

In my project I aimed to analyze data from the Nasa Exoplanet Archive, specifically data on orbital distance and planet radius. I wanted to see if there is any relation between these two measurements.

The python libraries I used to accomplish this were pandas, numpy, matplotlib, and scipy. I mainly used pandas to load, process, and filter my data. I used numpy to calculate the errors of the parameters of the curve I fitted to the plot. I used matplotlib to visualize the data along with the fitted model as well as the plot of the residuals. Lastly, I used scipy in order to perform the curve fitting to find the best fit parameters.

I first imported each of these libraries then proceeded to filter the data. I deleted the first seventeen lines of data because this wasn't necessary information, then I singled out the relevant columns of data and renamed them to make the code a little more legible in terms of what the data represents. Lastly, I deleted any rows without values for the necessary columns.

Below I will include an image of the plots in order to make my following explanations easier.



I first simply plotted the data in order to get a visualization of what type of model I would use to fit the data. I decided a power law fit would be best because the data appeared to curve up from the bottom and level out as the orbital distance increased. I used a log scale on the graph of the data because it allowed for a clearer visualization, otherwise the last couple data points would be increasingly further from each other making the plot a little harder to understand.

I then plotted the residuals based on the power law fit to the data. Based on the residuals plot, it seems like a fairly reliable fit until an orbital distance of 10 AU. I think this is because there is enough data above the line in which the original data plot evens out that the power law fit begins evening out somewhere above that line.

What I found from plotting this data is that in the earlier orbital distances, less than about 10 AU, planet radii seem random but as you move further away, the vast majority of planet radii are about one jupiter radii with very minimal exceptions of bigger planets and almost no exceptions of smaller planets.