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ASTP 720
HW 3
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I wrote up a module to do some simple least squares fitting. Using the data in the given text file, I recovered the following parameters for the given cepheid relationship. I have also quoted the uncertainties on these estimated parameters, which are simply the diagonal elements of the covariance matrix. All of the resulting parameters are shown in Table . I also plotted this fit twice, and have included three figures below. Figures and show a 3d plot which includes a surface plot generated using our fit parameters. The third is Figure , which plots log(P) vs M , and shows the fits for a variety of [Fe/H] values.

Table 1: Results for part one

Parameter	Value	Uncertainty
α	1.1522	0.143
β	0.9182	0.1676
γ	2.7689	0.2523

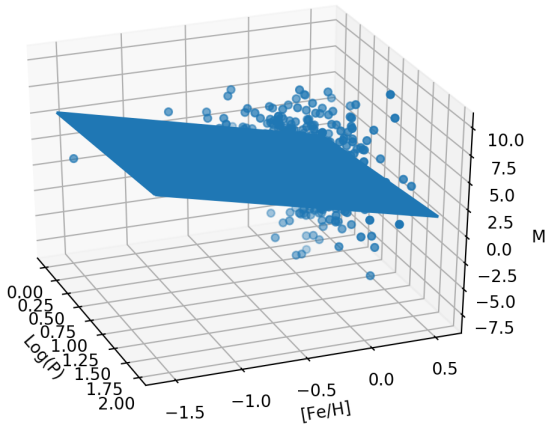

Figure 1: A view of a 3d plot including both the data and our fit

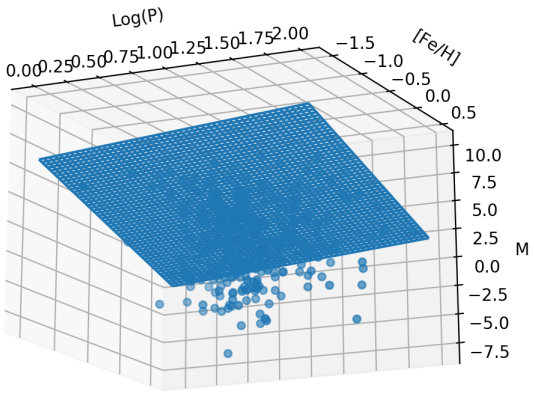

Figure 2: A different view of a 3d plot including both the data and our fit

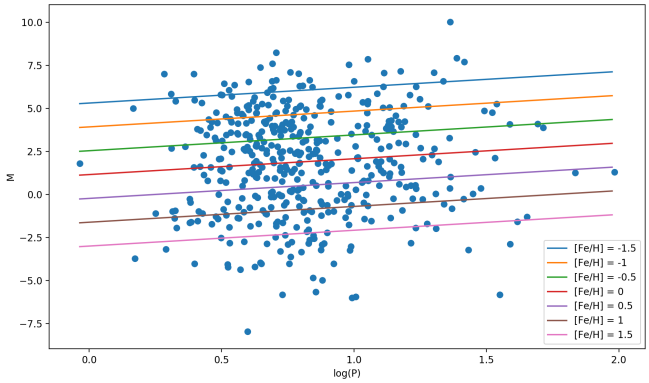

Figure 3: This plot shows our fit function with a few selected values for the metallicity.

Adding in a uniform error across all of our magnitudes does not change the results for the least squares fit, so our fitting parameters will be the same. The place where it does make a difference is in our uncertainties, because our covariance matrix will gain a factor of σ_m^2, which in our case is 0.01. Since we eventually take a square root of this to determine the uncertainties, this gives us an end result of a factor of 0.1 in our uncertainties. Note that the uncertainties with the error estimate will be lower than the uncertainties with no error quoted, because with no measurement error quoted a σ of 1 seems to be assumed, so having a lower σ value gives us lower uncertainties. Our new parameters are shown in table .

Table 2: Results for part three

Parameter	Value	Uncertainty
α	1.1522	0.0143
β	0.9182	0.01676
γ	2.7689	0.02523