Homework 11 - Physics 240
System of Spring and Matrix Inversion

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1 Introduction

The purpose of this excercise is to a fit (linear, power-law, or exponential) to a set of data, calculate the fit parameters, uncertainty, and χ^2 value.

2 Discussion and data

I got my data from NASA giss, specifically the Global annual mean surface air temperature change vs time. After fitting the data, I got the following outputs

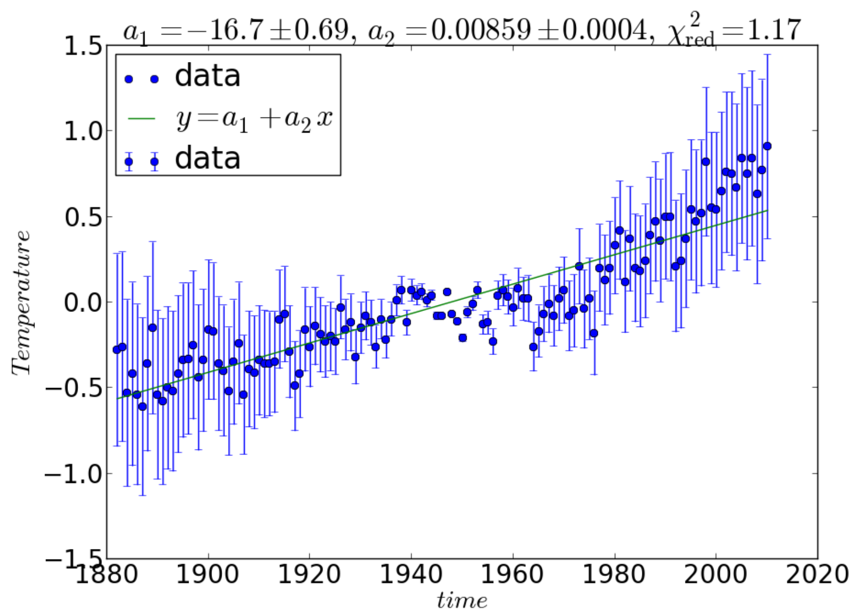

Figure 1: Linear fit of Global Temperature vs time

As shown, the a_1 value is -16.7±0.69, a_2 = 0.00859 ±0.0004, and χ^2 is 1.17. Because my data doesn't include σ_i I picked $\sigma_i = \sigma_o = 0.15$, which is reasonable for my data. Note that this is a linear fit, for the reason is that my data was less than 1 and some are negative, therefore doing a log(y) or ln(y) for the power-law or exponential was not a good idea because the data would then scatter all over the place like the following figure.

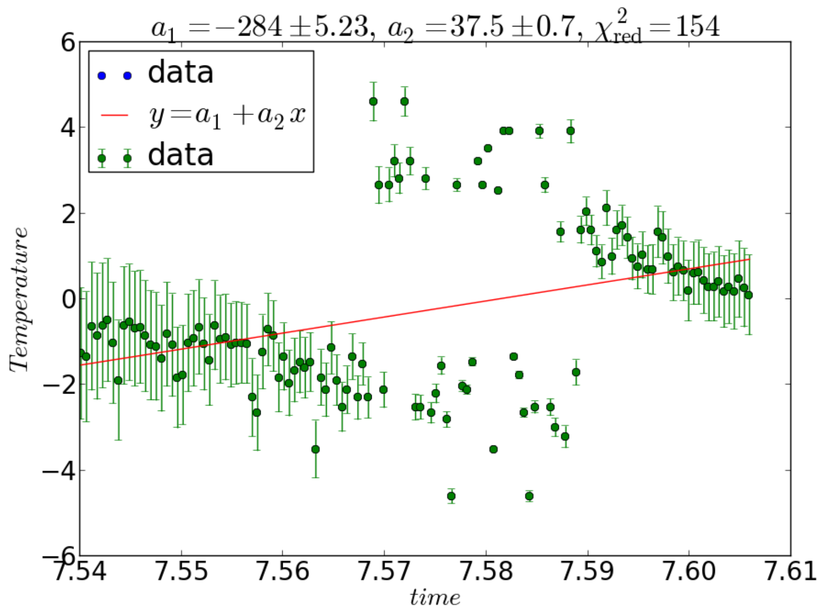

Figure 2: Power-law fit of Global Temperature vs time

The data scattered all over the place as the result of taking log of something less than 1, which then turns into a negative number.

If I just take the log without first moving the negative sign out, then some data point can't be computed because of log(negative) and I get the following plot.

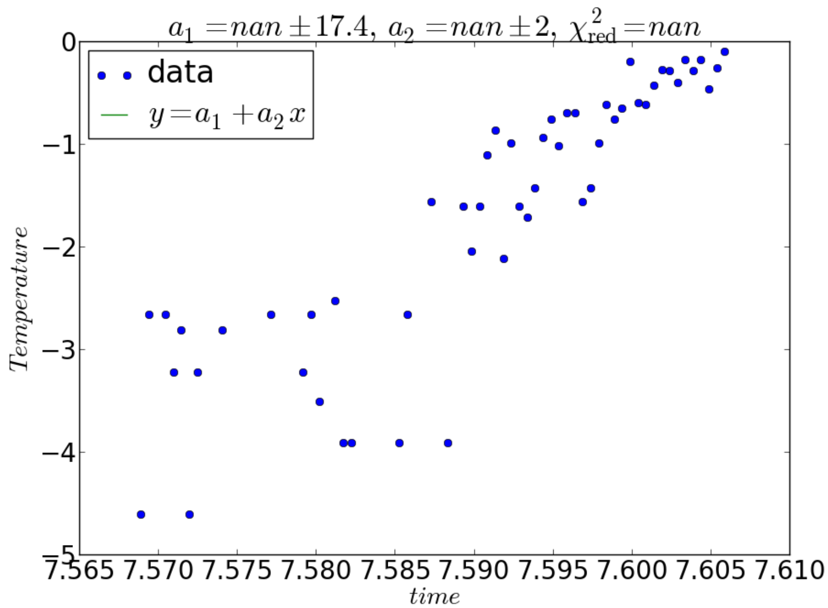

Figure 3: Power-law fit of Global Temperature vs time

In which none of the parameters were calculated. Therefor for this set of data, the Linear-fit is the best representation of the data. Even on NASA's website the plot is similar to mine.