Problem Set 4
PHY670: Astro Statistics
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1. You are given data (redshift, distance modulus, error in distance modulus) for a set of 42 galaxies using Cepheid variables and other means. These galaxies also have supernovae type Ia observed in them and hence these are used for calibrating supernovae for distance measurements to higher redshifts. Calculate the best fit using least squares and estimate the value of the Hubble's constant using this data.

2. Repeat the last exercise using χ^2 estimation by computing the value of χ^2 for $55 \leq H_0 \leq 85$. What is the value of reduced χ^2?

3. One method to find a minima of a function is to start from a guess value of the unknown parameter (H_0), find the gradient of the χ^2 and jump towards a lower value. By iterating this process, we can find the minimum χ^2. Write a program to use this method to find the minimum.

4. Try a one dimensional directed random walk to find the minimum, accepting only those steps that lead to a lower value of χ^2.