Statistics for Astronomers
Homework #9 (Due before 12:00 PM on Thursday, 2021.02.04)

Prof. Sundar Srinivasan

January 27, 2021

Notes: (1) You are welcome to use `Python` functions to evaluate probabilities for various distributions, and `Mathematica/Wolfram Alpha` to compute integrals if necessary. **Just mention your source in each case!** (2) Email me your `Python` scripts and any/all resulting output plots/images.

1. Remove the first six (not five!) rows from the data in Table 1 of Hogg et al. (2010) and answer the following questions, ignoring the uncertainties in the x variable:
   (a) (**3 points**) Compute a linear fit to these data. Print out the best-fit estimates for the parameters, their uncertainties, and the correlation coefficient between the slope and the intercept.
   (b) (**7 points**) Compute a quadratic fit to these data. Print out the best-fit estimates for the parameters, their uncertainties, and the covariance matrix.
   (c) (**4 points**) Use the best-fit parameters computed in the above parts to compute the best-fit reduced χ^2. Based on these values, which of the models would you say is a "better" fit to the data?
2. (**6 points**) This is a modified version of Exercise 8 from Hogg et al. (2010). Using bootstrap resampling, compute the standard deviations in the slope and intercept for the data used in Exercise 2 of the paper (*i.e.*, the uncensored dataset).