Pre-class assignment #15

PHY-905-005
Computational Astrophysics and Astrostatistics
Spring 2023

This assignment is due the evening of Wednesday March 22, 2023. Turn in all materials via GitHub.

Reading:

1. Chapters 2 and 3.1-3.7 of Modern Statistical Methods for Astronomy by Feigelson and Babu.
2. Table of contents of the book *All of Statistics: A Concise Course in Statistical Inference* by Larry Wasserman (Springer, 2004). The PDF version is available through the MSU Library, and included in this pre-class assignment. This is an incredibly useful resource for areas where Feigelson & Babu's descriptions are a little bit too concise.

Note that **we will be doing something a bit different in class** – I'll randomly select people to explain portions of the reading to the entire class, so be prepared!

Your assignment:

In the file `ANSWERS.md`, answer the following questions:

1. Why might we want to use Bayesian statistical analysis?
2. What is point estimation, and what are the relative strengths and weaknesses of the least-squares and maximum likelihood methods?
3. Why is resampling important in astronomy and astrophysics, and how do the jackknfe and bootstrap methods differ from each other?
4. When attempting to determine whether a model is the "best fit" to a given dataset, what are some of the choices you must make when deciding how to select your best-fit model?
5. After doing the assigned reading and answering the above questions, list at least three things that you are still puzzled by and would like to discuss more thoroughly in class.
6. Look through the table of contents of Feigelson & Babu. Which subjects seem like they will be the most useful for your research?