Pre-class assignment #20

PHY-905-005
Computational Astrophysics and Astrostatistics
Spring 2023

This assignment is due before class on Monday April 17, 2023. Turn in all materials via GitHub.

Reading:

1. Watch this short video on Bayesian statistics – this is a very good and concise tutorial!
2. Chapters 1-5.3 in Bayesian Methods for the Physical Sciences, by Andreon et al. (available electronically at the MSU Library and via the included PDF). Note that it's 5 chapters, but each one is VERY short.
3. Jake VanderPlas' blog post on Frequentist vs. Bayesian statistics (note: this blog post was converted into a paper on the arXiv.). This reading provides a complementary approach to Andreon's.

Your assignment:

1. In Bayes' Theorem (Equation 2.7 and following in Andreon), what is the utility of the inclusion of prior and evidence probabilities? (i.e., the rightmost term and term in the denominator in equation 2.7). In other words, why is it useful to include them?
2. Fundamentally, what is the difference between the frequentist and Bayesian approaches toward statistical inference? How does this manifest in the way that these approaches are used?
3. In the file `ANSWERS.md`, write down any questions that you have about the material you read, any points that are not clear, or anything you'd like to know more about. Aim for at least 3 questions/unclear points/etc.

Handing it in: Include your answers to the questions (in the file `ANSWERS.md`) in your assignment.