PHSX 315 Assignment 3

Problem 1

Goal: Measure π using one million random points in 3-d space by measuring the fraction of the volume of a cube with side-length of 2 that is occupied by the unit sphere (the sphere with radius of 1).

Report the absolute and relative deviation of the measured value of π from the true value for two different choices of random number seed. You should be able to estimate the uncertainty on your values of π. This can be done either empirically by measuring the standard deviation of smaller subsets of the data (for example 100 sub-sets of 10,000 points each), or from first principles related to the expected variance of the binomial probability distribution for N=1,000,000.

Does this 3-d method have the same precision, more precision, or less precision compared with the 2-d method for the same number of points? Do you understand why?

Deliverables. You should upload to your repository a summary of your findings, a copy of your code, example results from running the code, and appropriate figures.