STAT 753 Homework 2
SPRING 2020

Due on Thursday February 13 at the beginning of lecture.

1. Using the central limit theorem (CLT) R script that we discussed in class, modify it to generate n uniform random numbers from a generic interval $[a, b]$. Include your modified R code and sample histograms for the unit interval $[0, 1]$ using two different sample sizes: $n = 5$ and $n = 20$ (keep s fixed at 1000).

2. Discuss how the uniform case differs from the exponential case in terms of the sample size needed for the histogram of sample means to look normally distributed.

3. Again using the CLT R script, modify the code to draw n random numbers from a bimodal distribution (e.g. beta distribution with both parameters less than 1) and show that the CLT holds. Include your modified R code and sample histograms.

4. **BONUS:** Use the Kolmogorov-Smirnov test (KS.test function) in R to formally check how well a random sample agrees with the normal distribution. Include R code and sample output for a random sample of your choice and interpret the p-value you get.

   [Note: The default is to compare to standard normal so if the distribution of sample means isn't normalized, make sure you use the appropriate mean and sd!]