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## Statistics 251: Lab 5 Exercises – Central Limit Theorem

### Important reminders:

1. Keep track of time so that you will finish on time.
2. Recall the distinction between the sample size and the number of samples.
3. Recall the R commands related to a Uniform distribution:

dunif(x, min, max)  
runif(n, min, max)

f(x)  
random draws from a Uniform distribution

### Exercises:

Your daily commute to school involves waiting for the bus. After drawing a histogram of the time taken waiting for the bus, you observe that the wait time is *Uniformly* distributed between 5 and 20 minutes. Let  $X$  = wait time (in minutes).

Let's observe how the Central Limit Theorem works using the above distribution.

1. Observe the shape of the **probability density function** of  $X$ . **(5 min)**

Draw a random sample of size 500, construct a histogram and observe the shape.

2. Observe the **distribution of sample means** of “small” sample sizes. **(10 min)**

Draw 1000 samples of size 5, construct a histogram of the *sample means*, and observe the shape.

3. Observe the **distribution of sample means** of “large” sample sizes. **(10 min)**

Draw 1000 samples of size 50, construct a histogram of the *sample means*, and observe the shape.

4. What is the **effect of sample size** on the distribution of *sample means*? **(5 min)**

Compare the *center* and *spread* of the two distributions of the *sample means*.