Coding in advance of the Feb 11, 2019 class

Write a code that draws x from an exponential distribution, $P(x) = e^{-x}$ (where x can be from 0 to ∞), n times, computes the arithmetic mean, and then does it again and again, a total of m times. To do a single draw, select a random number y uniformly between 0 and 1 (this is called a uniform random deviate, with a range from 0 to 1). Then $x = -\ln(y)$ selects properly from the distribution $P(x) = e^{-x}$ (you might want to think about how to prove this).

Your goal is that, given n and m, your code will produce a plot with the probability distribution of the arithmetic mean. In particular, please do so for $n = 1, 2, 5, 10$, and 100, and do $m = 10,000$ iterations each time. The details here will be useful when we think more about continuous probability functions. How should you gather your results to show the distribution? For example, as we'll see in the third class, we expect that the distribution of the arithmetic mean should narrow more and more as n becomes larger, so it's not helpful to just plot the same range of x for any n.

If you have the time, you might want to compute the arithmetic mean and the standard deviation expected for the function $P(x) = e^{-x}$. Then you can determine the accuracy of the central limit theorem as you compute the distribution of the arithmetic mean of more and more draws from this distribution. This, however, is *not* a required part of the problem.