**In-Class Assignment 11**

1. Define an exponential random variable with parameter λ = 1/3. Generate 2 sets of simulations of the random variable (call them exp\_1 and exp\_2) of 10,000 simulations each. Create a third variable su which is the sum of exp\_1 and exp\_2. Verify that
   1. E(su) = E(exp\_1) + E(exp\_2)

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* 1. Var(su) = Var(exp\_1) + Var(exp\_2)

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1. Create 1,000,000 simulations of a multivariate normal random variable similar to the one you worked with in ICA 9 (set var(X) = var(Y) = 1.5, and cor(X,Y) = -0.8), and call it mvn. x will be the first column of mvn and y will be the second column (for example, x = mvn[,1]). Create a new variable z which is the sum of the two outputs from the simulation. Verify from the experimental data that
   1. Cov(x, y) = -1.2

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* 1. E(z) = E(x) + E(y)

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* 1. Var(z) = Var(x) + Var(y) + 2Cov(x, y)

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1. For this problem we will look at sample means of an exponential distribution with mean value 3 (parameter is 1/3). Create 20,000 simulation sets of 10,000 simulations each for this distribution. Calculate the means of the 20,000 sets and plot a histogram. Does the histogram look approximately like a normal distribution?

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