STAT 315 Chapter 5 Review Questions

Given the following proposed joint PDF:

$$f_{X,Y}(x,y) = \begin{cases} kye^{-yx} & \begin{matrix} 0 \leq x < \infty \\ 0 \leq y \leq 1 \end{matrix} \\ 0 & \text{else} \end{cases}$$

1. Find the value of *k* that makes this a valid joint probability density function

2. Find the marginal distributions of X and Y.

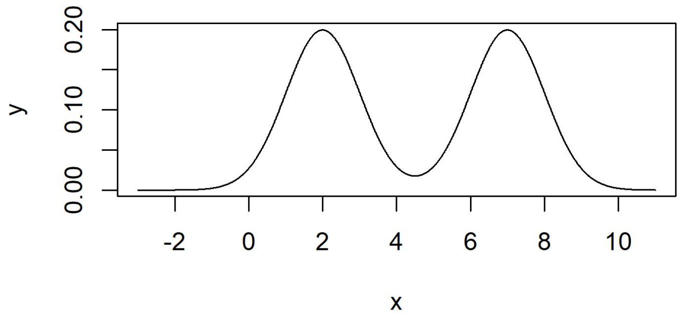
3. What sort of random variable is X? What sort of random variable is Y? Specify the value of any relevant parameters.

4. Compute the covariance between X and Y (hint: you will need integration by parts to compute E(XY)).

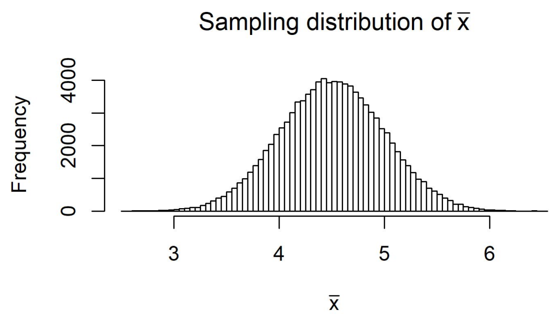
5. Based on your answer to question 4, what can you say about whether X and Y are independent?

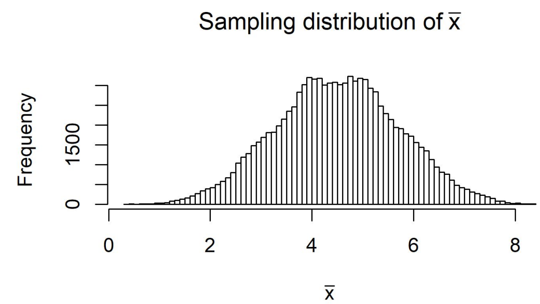
6. Verify your answer from question 5 by directly checking whether X and Y are independent.

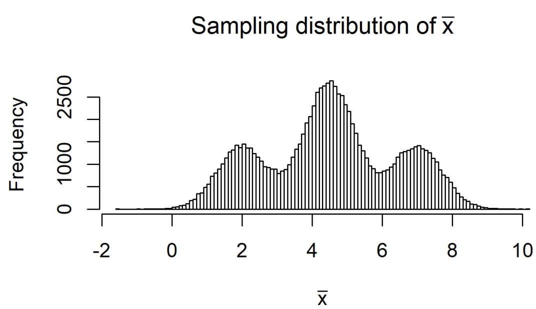
The following probability distribution is one example of a mixture distribution:

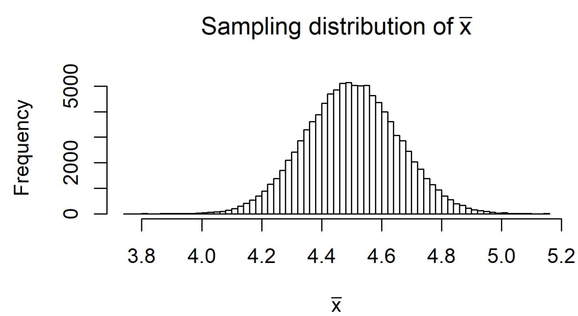


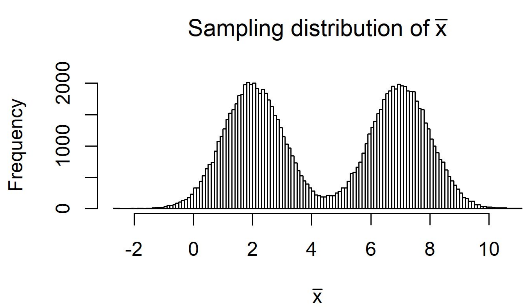
The following simulated sampling distributions are from samples of size 1, 2, 5, 10, 30, and 300 (not necessarily in that order). Label each sampling distribution with the correct sample size.

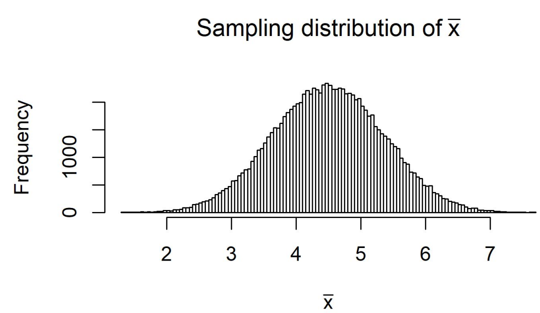












Match the following descriptions on the left with the correct term on the right. All descriptions are true, but not all will be matched with a term

As the sample size increases, the sampling distribution of the sample mean gets closer to the population mean	Standard Error
Knowing the value of one variable tells you nothing about the probability of the other variable	iid Random Variables
As the number of samples gets larger and larger, we achieve a better approximation to the sampling distribution	Law of Large Numbers
As the sample size increases, the mean of a single sample approaches the population mean	Independent Random Variables
The standard deviation of a sampling distribution	Central Limit Theorem
All random variables are independent of one another and follow the same probability distribution	Correlation
The linear relationship between two random variables	