**STT 810**

**ICA 1**

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1. Practice with the sample function.
   1. Run a command to create 10 samples of picking a integer from 1 to 50.
      1. ANS - d1 <- seq(1:50)

sample(d1,10)

* 1. Run a command to create 10 samples of picking a integer from 1 to 50, with 2 no numbers being the same.
     1. ANS - sample(d1,10,replace = FALSE)
  2. How would you expect the averages to compare between the 2 above?
     1. ANS - a <- mean(sample(d1,10))

b <- mean(sample(d1,10,replace = FALSE))

The average comes out to be different, and is greater when replace is kept true.

* 1. Give a command for creating 100 samples of a picking either 0 or 1, with 0 having probability 2/3 and 1 having probability 1/3.
     1. ANS - d2 <- c(0:1)

sample(x = d2,size = 100,replace = TRUE , prob = c(2/3,1/3))

* 1. Repeat (d) without a prob statement in the command.
     1. ANS - sample(x = d2,size = 100,replace = TRUE)

1. Practice with the runif function
   1. Run a command to create 10 samples of picking a number from 0 to 5 (continuous result)
      1. ANS - runif(n = 10,min = 0,max = 5)
   2. Run a command to create 10,000 samples of picking a number from 0 to 5 (continuous result). Store it in variable u. Then use the hist(u) command to plot a histogram of this result. Does it look approximately uniform?
      1. ANS - u <- runif(n = 10000,min = 0,max = 5)

hist(u)

The sampling histogram comes out to normalize itself when iterations are increased.

* 1. Now run hist(u^2), while will create a histogram of the square of the sample. Is it still uniform?
     1. ANS - hist(u\*u)

The graph is not uniform, but shows a decreasing pattern over x axis.

1. For the table in slide 8, find
   1. P(Michigan | commuter)
      1. ANS – 0.31/0.68
   2. P(commuter | Michigan)
      1. ANS – 0.31/0.43
   3. Suppose two events A and B have P(A) = 0.4 and P(B) = 0.6.
      1. What is the probability of both A and B if they are independent?
         1. ANS – 0.24
      2. What is the minimum value of P(A and B)
         1. ANS – 0.4
      3. What is the maximum value of P(A and B)?
         1. ANS – 0.6

Screen Shot of Code for one Look.

