**1. What is the mean and variance for the loaded dice?**

= 0.1\*1 + 0.1\*2 + 0.1\*3 + 0.1\*4 + 0.1\*5 + 0.5\*6 = 4.5

Var(X) =

= (0.1\*1^2 + 0.1\*2^2 + 0.1\*3^2 + 0.1\*4^2 + 0.1\*5^2 + 0.5\*6^2) – 4.5^2 = 3.25

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*R code to calculate mean and variance\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*9999**

> remove(list=objects())

> values <- c(1,2,3,4,5,6)

> values\_pdf <- c(rep(.1,5), .5)

> # values\_pdf <- rep(1/6,6)

> expected\_value = sum(values\*values\_pdf); expected\_value

[1] 4.5

> pdf\_times\_value\_squared = sum(values^2\*values\_pdf); pdf\_times\_value\_squared

[1] 23.5

> variance\_die <- pdf\_times\_value\_squared - expected\_value^2; variance\_die

[1] 3.25

**2. Make a function in R that “rolls” this dice; return a vector containing the rolls.**

So if I call: myRolls <- rollLoadedDie(1000)

I would get a vector of size 10,000 that contains the rolls of my loaded die.

**3. Make a histogram of some large number of rolls. Do the rolls of the loaded die approximate a uniform distribution?**

**4. Modify the code on Slide #58 of lecture #2 so that the mean vs. trial size plots are from the loaded die. Generate these plots a few times. How many rolls appear to be necessary to get convergence on the expected values for the mean and variance?**