Discussion - Week5

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```
library(matlib)
```

Example 1.2 (Coin Tossing)

As we have noted, our intuition suggests that the probability of obtaining a head on a single toss of a coin is 1/2. To have the computer toss a coin, we can ask it to pick a random real number in the interval [0, 1] and test to see if this number is less than 1/2. If so, we shall call the outcome heads; if not we call it tails. Another way to proceed would be to ask the computer to pick a random integer from the set {0,1}. The program CoinTosses carries out the experiment of tossing a coin n times. Running this program, with n = 20, resulted in:

```
n <- 20
result_lst <- vector(mode='list', length=n)

for (i in 1:n ) {
    result_lst[i] <- rbinom(1, 1, 0.5)
}
```

Exercises 1

Modify the program CoinTosses to toss a coin n times and print out after every 100 tosses the proportion of heads minus 1/2. Do these numbers appear to approach 0 as n increases? Modify the program again to print out, every 100 times, both of the following quantities: the proportion of heads minus 1/2, and the number of heads minus half the number of tosses. Do these numbers appear to approach 0 as n increases?

`

```
n <- 10000
calc_count = 1000

result_lst <- vector(mode='list', length=n)

for (i in 1:n ) {
    result_lst[i] <- rbinom(1, 1, 0.5)

    if (i %% calc_count == 0) {

        s <- sum(unlist(result_lst)) / i - 0.5
        h <- sum(unlist(result_lst)) - (0.5 * i)
        print(paste0(i, ' = ' , s , ' : ' , h ))
    }

}
```

```
## [1] "1000 = -0.003 : -3"
## [1] "2000 = 0.005 : 10"
## [1] "3000 = -0.002 : -6"
## [1] "4000 = -0.000749999999999973 : -3"
## [1] "5000 = 0.000800000000000023 : 4"
## [1] "6000 = -0.000166666666666648 : -1"
## [1] "7000 = 0.000714285714285667 : 5"
## [1] "8000 = 0.00512500000000005 : 41"
## [1] "9000 = 0.00455555555555553 : 41"
## [1] "10000 = 0.00319999999999998 : 32"
```