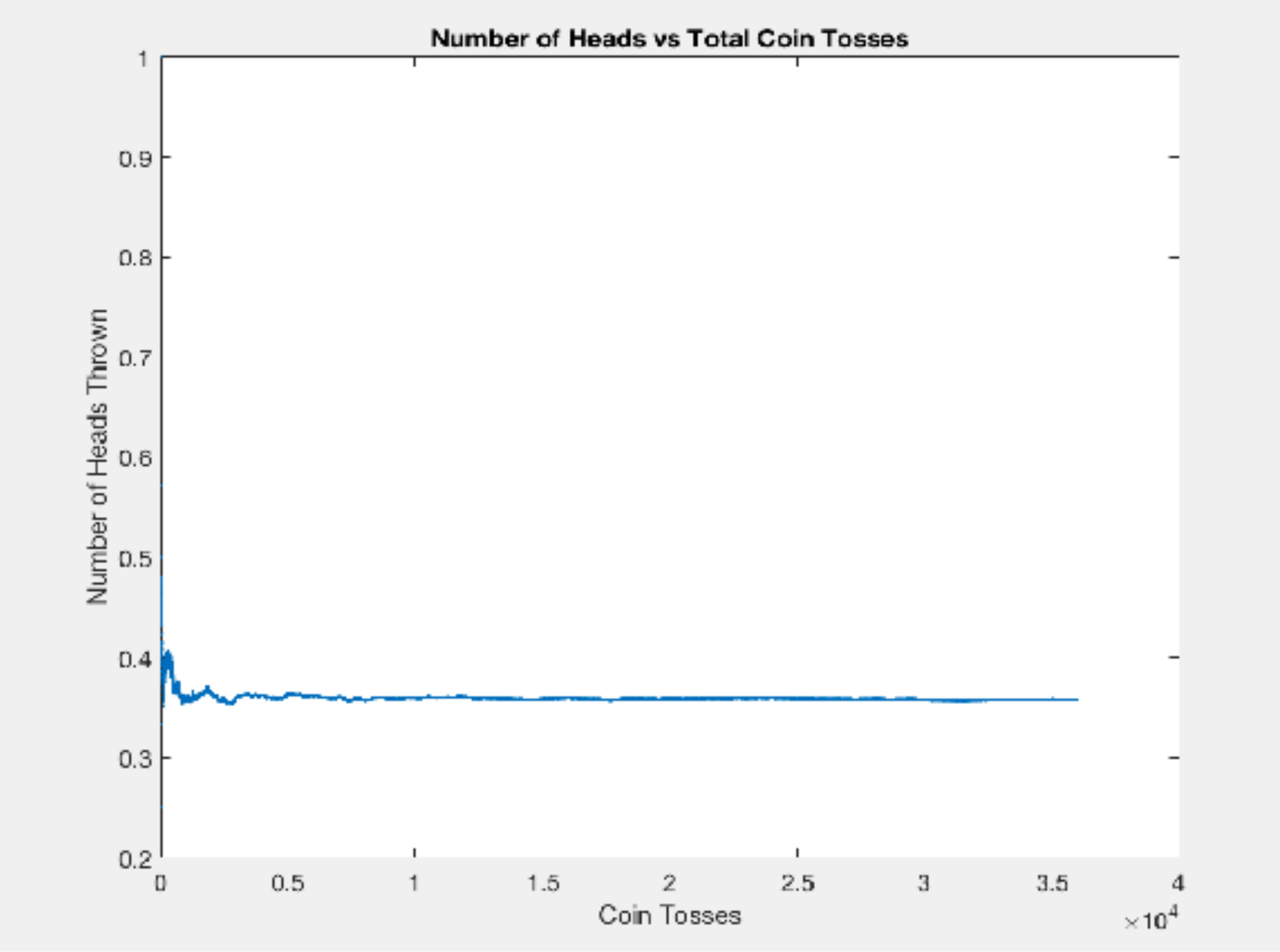
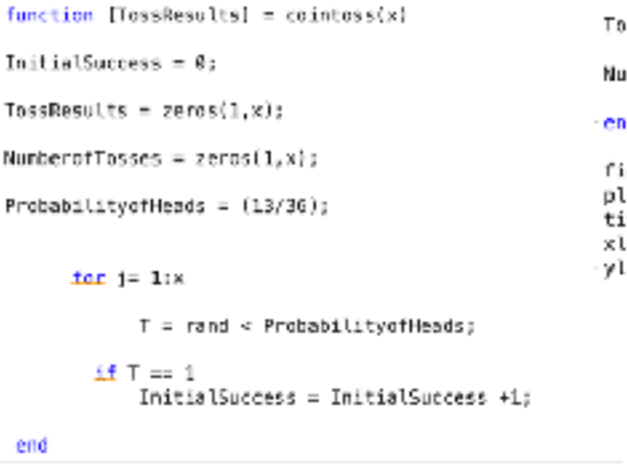
Keeyan Haghshenas
February 23, 2018
Probability and Random Processes
HW 1: Coin Tossing

HW 1: Coin Tossing

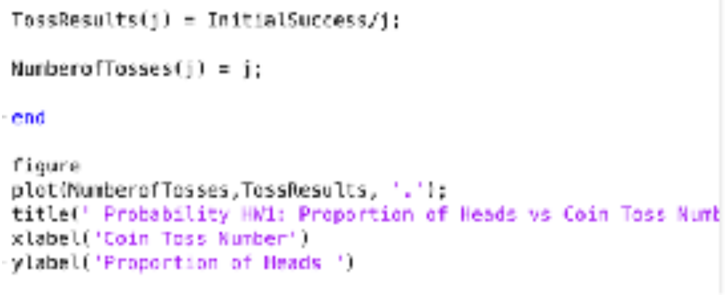
1: Graph:



2: Matlab Code



```
function [TossResults] = cointoss(x)

InitialSuccess = 0;

TossResults = zeros(1,x);

NumberofTosses = zeros(1,x);

ProbabilityofHeads = (13/36);


      for j= 1:x

            T = rand < ProbabilityofHeads;

        if T == 1
            InitialSuccess = InitialSuccess +1;

 end
```



```
TossResults(j) = InitialSuccess/j;

NumberofTosses(j) = j;

end

figure
plot(NumberofTosses,TossResults, '.');
title(' Probability HW1: Proportion of Heads vs Coin Toss Numb
xlabel('Coin Toss Number')
ylabel('Proportion of Heads ')
```

3: How it works:

First we declare the function that we are going to use. Then I declared that the beginning success (number of heads shown during the tosses) would be zero, I did this so that there was no bias in the data and so I could loop this variable later in the code. Then I declare two arrays that start at 1 and go to the input variable which in this case is 36000 tosses. Both arrays must have the same number elements because one stores the results of the tosses and the other stores the number of tosses, therefore they need to store elements from 1 to 36000(the input variable). The I set the probability of receiving a heads (a success) equal to 13/36 because the last four digits of my RUID number are 0,8,4,1. After doing this I created a loop, this loop runs from 1 trial all the way to the input variable (in this case 36000) this loop runs 36000 times simulating all the tosses. In this loop I declared the variable T equal to the fact that the rand function (a function that generates arrays with elements uniformly distributed between 0 to 1) must be less than the Probability of getting a heads (13/36). This was to account for all the number of tails that would occur, because after I used a nested if statement to state that if T = 1 (the case where we get a heads) the number of successes (heads thrown) would increase by 1. I then ended that statement and continued the loop by stating that the number of heads thrown divided by the number of throws is equal to the array of resulting tosses (filling this array). I further stated that the number of tosses is equal to the number of times the loop loops (the number of tosses). Then I used the basic Matlab functions to plot the graph and see the results.

4: Reasoning

The limitation of this assignment was to set the probability of heads equal to the sum of that four digits of your RUID number divided by 36. When doing so that yields 36.11% chance of heads. Reading from the graph it is evident that as the more tosses where thrown the closer the percentage became to the results (this was because of the fact that I set Probability =

13/36). Being relatively new to coding I chose the variable names to help me through the logic of the code as well as using x and y because those were the letters in the Matlab lectures I used to refresh my memory of the functions with. While doing this assignment I realized, running random processes on C++ (a programming language I am currently learning) is much more difficult when compared to Matlab which is relatively simple. That was the reason I chose to run this on Matlab rather than C++.