**Assignment 1**

**Question 1**:Coin Toss Simulation

Through a coin toss simulation, show that probability of getting HEAD, by tossing a fair coin, is about 0.5. Write your observation from the simulation run.

**Solution**:

**Algorithm** CoinToss()

*//Function to simulate coin toss*

**{**

outcome = rand(1);

outcome = round(outcome);

**return** outcome;

**}**

Clearly, the graph converges further and further towards 0.5 as the number of experiments performed increases.

**Question 2**: Sort Analysis

Implement two different versions of bubble sort for randomized data sequence.

**Solution:**

**Algorithm** BubbleSort(arr)

*//Sorting an array using classical bubble sort*

**{**

len = length(arr)

**for** i := 1 **to** len **do**

**{**

**for** j := i **to** len-1 **do**

**{**

**if** (arr[j] > arr[j+1]) **then**

**{**

temp = arr[j];

arr[j] = arr[j+1];

arr[j+1] = temp;

**}**

**}**

**}**

**}**

**Algorithm** modifiedBubbleSort(arr)

*//Sorting an array using modified bubble sort.*

*//A* *flag is used to determine if array is already sorted*

**{**

len = length(arr);

sorted = true;

**for** i := 1 **to** len **do**

**{**

sorted = true;

**for** j = i := len-1 **do**

**{**

**if** (arr[j] > arr[j+1]) **then**

**{**

temp = arr[j];

arr[j] = arr[j+1];

arr[j+1] = temp;

*//If a swap occurs then array is not sorted.*

sorted = false;

**}**

**}**

**if** (sorted)

**return**;

**}**

**}**