Assignment 3: More Simulations

Due: Sep 29th, 2015 at 9:59 am

Question 1: Coin Simulation and For Loop

Consider that you are tossing a fair coin for many times. And the tossing strategy is you won't stop until you get 3 consecutive heads. After you stop, assuming that you have made n tosses.

For example:
If your result is {H, H, T, T, H, T, H, H, H}, then $n = 9$.
If your result is {T, H, H, H}, then $n = 4$.

Please use R to simulate the expection of n: $\mathbb{E}[n]$; in other words, how many tosses is needed on average, to be able to get three consecutive heads.

Please use for loop to complete your simulation.

Bonus Question

You will get 15% bonus if you can mathematically prove your result.

Question 2: Removing NA values

Please download the data *GOOGwNA.csv*. You need to:

- Remove all rows containing NA.

- Create a CSV file after removing NAs.

- Within the file you just created, calculate the average of every column with APPLY FUNC-TIONS except the first column (date).

Question 3: The Monty Hall Simulation

Some of you probably have heard about the "Monty Hall" problem:

"Suppose you're on a game show, and you're given the choice of three doors: behind one door is a car; behind the others, goats. You pick a door, say No. 1, and the host, who KNOWS whats behind the other doors, opens another door, say No. 3, which has a goat. He then says to you, Do you want to switch to door No. 2? Is it to your advantage to take the switch?"

Please use R to do a simulation, and calculate the probabilities of "win after switch" and "win without switch". Use a function to do this simulation, take "number of simulations" as a parameter and take two numeric values as output. (Hint: sample(3, n, replace...))

For example:

```
> MontyHallSim(1000)
[1] Win after switch: 0.5
[1] Win without switch: 0.5
```