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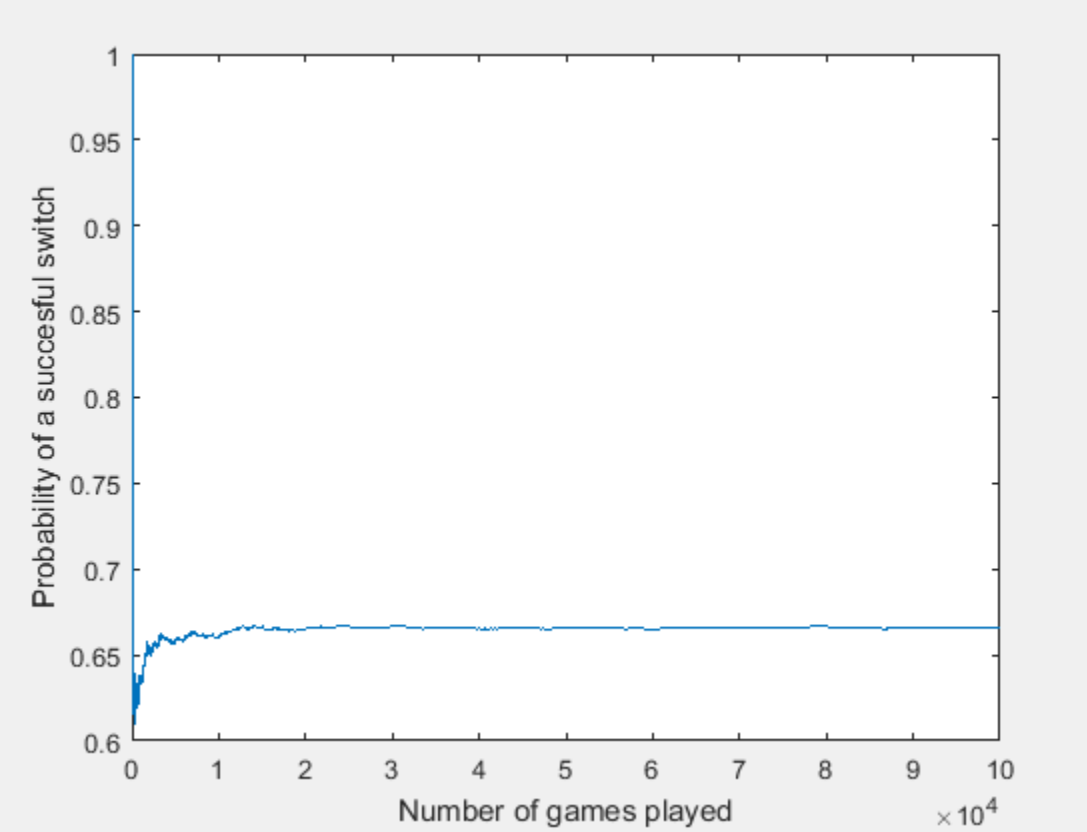
Probability

Monty Hall Simulation

1)

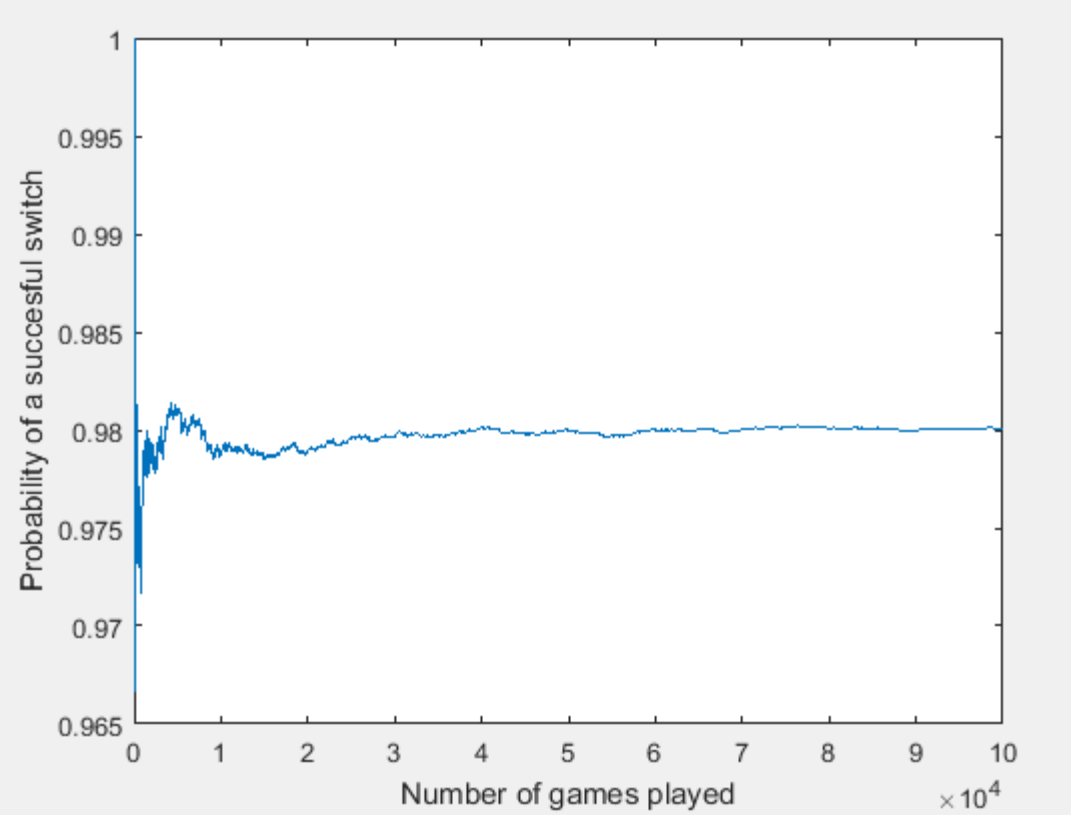


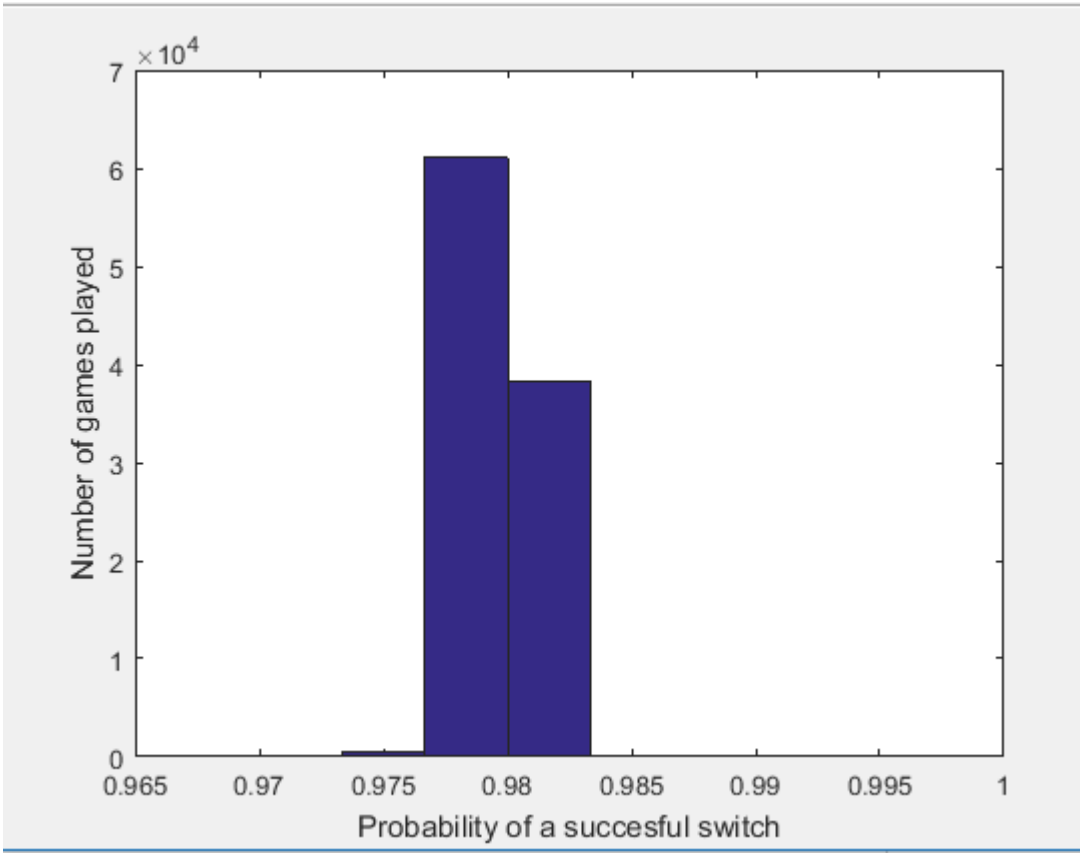
2)

```
clc
clear all
close all
numOfSimulatedGames = 100000;
numGamesPlayed = 0;
successfulSwitch = 0;
probabilityOfSuccess=zeros(1,numOfSimulatedGames);
for numGamesPlayed = 1:numOfSimulatedGames
doors = zeros(1,100);
rNum = 100*rand();
for i = 1:100
if( (rNum>i) && (rNum<i+1))
```

```
doors(i) = 1;
end
end
for i = 1:100
if(doors(i)==0)
doors(i) = 2;
end
end
rNum = 100*rand();
for i = 1:100
if( (rNum>i) && (rNum<i+1))
chosenDoor = i;
end
end
picked = 0;
for i = 1:100
if(i~=chosenDoor)
if(doors(i)~=1)
if(picked==0)
doors(i)=100;
picked =1;
end
end
end
end
for i = 1:100
if(i~=chosenDoor)
if(doors(i)~=100)
if(doors(i)==1)
successfulSwitch = successfulSwitch+1;
end
end
end
end
probabilityOfSuccess(numGamesPlayed) = successfulSwitch / numGamesPlayed;
end
xaxis = 1:numGamesPlayed;
figure
plot(xaxis,probabilityOfSuccess);
xlabel('Number of games played')
ylabel('Probability of a succesful switch')

hist(probabilityOfSuccess);
ylabel('Number of games played')
xlabel('Probability of a succesful switch')
```


Probability of a succesful switch
1
0.995
0.99
0.985
0.98
0.975
0.97
0.965
0
1
2
3
4
5
6
7
8
9
10
Number of games played
×10^4


×10^4
7
6
5
4
3
2
1
0
Number of games played
0.965
0.97
0.975
0.98
0.985
0.99
0.995
1
Probability of a succesful switch

Summary:

When you have to make a decision between three doors, and you choose one, the announcer (who already knows all the answers) has to choose and open one, but it has to be always a door with a goat, he is going to leave behind the door with the car intact in the case you pick a wrong one, normally the probability to get the car is 1/3, but after he reveals one door the chances to win by switching is 2/3.

If we apply that way of thinking to 100 doors and he reveals 98, the probability will increase as shown in the plot. For 100 doors the probability is 1/100, and the probability of switching is 98/100. The more doors you add the higher probability to win by switching. This case only applies if he opens 98 doors, if he only opens one the probability would still be too low to win by switching. It matters that you have 3 or 100, the more doors the higher the probability to win by switching. This case only applies if the announcer knows were the car is. In our plots the probability of the first case is 66% and for the second case is 98%.