In [1]:
```
# Some helpful imports -- feel free to import any other libraries you ne
ed!
import numpy as np
import numpy.random as npr
import random
import matplotlib.pyplot as plt
import math
%matplotlib inline
```

1) Suppose the pocket contains one fair coin and one two-headed coin. Find the approximate probability that the coin is fair given that it came up heads on the first flip.

In [2]:
```
coins = [['H','T'],['H','H']]
num_sims = 100000
# num_sims = 5
times_to_flip = 1

heads_count = 0
fair_coin_count = 0
coin_indexes = range(0,len(coins))
outcomes = []
for i in range(0, num_sims):
    coin = coins[random.choice(coin_indexes)]
#     print(coin)
    outcome = random.choices(coin, k=times_to_flip)
    outcomes.append(outcome)
#     print(outcome)
    if outcome == ['H']:
        heads_count+=1
        if coin == ['H', 'T']:
            fair_coin_count+=1

print('The probability of this occuring is ~',fair_coin_count/heads_coun
t,'.',sep='')
```

```
The probability of this occuring is ~0.3340150786012191.
```

2) Suppose the pocket contains one fair coin and one two-headed coin. Find the approximate probability that the coin is fair given that it came up heads on the first two flips.

In [3]:
```
coins = [['H','T'],['H','H']]
num_sims = 100000
times_to_flip = 2

heads_count = 0
fair_coin_count = 0
coin_indexes = range(0,len(coins))
outcomes = []
for i in range(0, num_sims):
    coin = coins[random.choice(coin_indexes)]
#     print(coin)
    outcome = random.choices(coin, k=times_to_flip)
    outcomes.append(outcome)
#     print(outcome)
    if outcome == ['H','H']:
        heads_count+=1
        if coin == ['H', 'T']:
            fair_coin_count+=1

print('The probability of this occuring is ~',fair_coin_count/heads_coun
t,'.',sep='')
```

```
The probability of this occuring is ~0.19886409344681671.
```

3) Repeat part 1 if her pocket contains two fair coins and one two-headed coin.

In [4]:
```
coins = [['H','T'],['H','T'],['H','H']]

num_sims = 100000
times_to_flip = 1

heads_count = 0
fair_coin_count = 0
coin_indexes = range(0,len(coins))
outcomes = []
for i in range(0, num_sims):
    coin = coins[random.choice(coin_indexes)]
#     print(coin)
    outcome = random.choices(coin, k=times_to_flip)
    outcomes.append(outcome)
#     print(outcome)
    if outcome == ['H']:
        heads_count+=1
        if coin == ['H', 'T']:
            fair_coin_count+=1

print('The probability of this occuring is ~',fair_coin_count/heads_coun
t,'.',sep='')
```

```
The probability of this occuring is ~0.5014275677534119.
```

4) Repeat part 2 if her pocket contains two fair coins and one two-headed coin.

In [5]:
```
coins = [['H','T'],['H','T'],['H','H']]

num_sims = 100000
times_to_flip = 2

heads_count = 0
fair_coin_count = 0
coin_indexes = range(0,len(coins))
outcomes = []
for i in range(0, num_sims):
    coin = coins[random.choice(coin_indexes)]
#     print(coin)
    outcome = random.choices(coin, k=times_to_flip)
    outcomes.append(outcome)
#     print(outcome)
    if outcome == ['H','H']:
        heads_count+=1
        if coin == ['H', 'T']:
            fair_coin_count+=1

print('The probability of this occuring is ~',fair_coin_count/heads_coun
t,'.',sep='')
```

```
The probability of this occuring is ~0.3324159820011651.
```