INFO 7390 Advances in Data Sciences and Architecture Assignment 1

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Due: Sunday May 20, 2018

Q1 (5 Points) How many people must there be before the probability that at least two people have a birthday on October 3 is greater than 1/2?

612

```
Number: 609 Ratio: 0.49/19493383556246
Number: 610 Ratio: 0.4980571402168832
Number: 611 Ratio: 0.4989183962841321
Number: 612 Ratio: 0.4997787007727037
Number: 613 Ratio: 0.5006380524320544
```

The calculation is in Assignment1.py under comment #Question1

Q2 (5 Points) Write python code to simulate question 1.

```
0.476

0.495

0.484

0.487

0.445

0.477

0.492

0.462

0.477

0.466

0.483

0.505

601
```

The simulation is in Assignment1.py under comment #Question2

Q3 (5 Points) What is the probability of getting exactly 2 heads after flipping three coins?

0.375



Calculation is in Assignment1.py under comment #Question3

Q4 (5 Points) Write python code to simulate question 3.



The simulation is in Assignment1.py under comment #Question4

Q5 (5 Points) Consider a six-sided die that gets a 1 with probability p = 1/6. What is the probability that you can get a 1 after rolling the die 3 times? What is the probability of getting exactly one success (a roll of 1) in three tries?

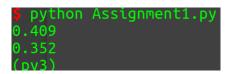
0.42

0.35

```
python Assignment1.py
0.42129629629629617
0.3472222222222215
(py3)
```

Calculation is in Assignment1.py under comment #Question5

Q6 (5 Points) Write python code to simulate question 5.



The simulation is in Assignment1.py under comment #Question6

Q7 (5 Points) Suppose the MTV Video Music Awards allows users to vote for the following for "video of the year."

- i. Miley Cyrus "Wrecking Ball" (https://www.youtube.com/watch?v=My2FRPA3Gf8)
- ii. Iggy Azalea- "Fancy" (https://www.youtube.com/watch?v=O-zpOMYRi0w)
- iii. Brad Paisley "The Ballad Of Honey Boo Boo" (https://www.youtube.com/watch?v=11Uq3iGESYM)

Of those making deliberate votes 50% would vote for Brad Paisley - "The Ballad of Honey Boo Boo," 30% for Miley Cyrus - "Wrecking Ball" and 20% for Iggy Azalea- "Fancy." However, 25% of voters are lazy and just click one of the three options with equal probability.

- i. Let M be a random variable that represents the expected votes for Miley Cyrus -"Wrecking Ball"
- ii. Let I be a random variable that represents the expected votes for Iggy Azalea-"Fancy"
- iii. Let B be a random variable that represents the expected votes for Brad Paisley "The Ballad Of Honey Boo Boo"

Calculate M, I and B. Show your work.

M: 0.31

I: 0.23

B: 0.46

Calculation is in Assignment1.py under comment #Question7

Q8 (5 Points) Write python code to simulate question 7.

```
python Assignment1.py
M: 0.3083546
I: 0.20558
B: 0.4860654
(pv3)
```

The simulation is in Assignment1.py under comment #Question8

Q9 (5 Points) Suppose you're on a game show, and you're given the choice of n doors: Behind one door is a million dollars; behind all the others, donuts. You pick a door, say No. 1, and the host, who knows what's behind the doors, opens another door, say No. 3, which has a donut. He then says to you, "Do you want to another door?"

(1 Point) Is it to your advantage to switch your choice? Assume k of the n doors are revealed:

Yes

(2 Points) What is the probability of getting the million dollar door if you stay? 1/(n-k)

(2 Points) What is the probability of getting the million dollar door if you switch to another non-revealed door?

```
(n-k-1)/(n-k)*1/(n-k-2)
```

Calculation is in Assignment1.py under comment #Question9 (You can change n and k parameter, in example program, we choose n = 4, k = 2)

Question9: Stay: 0.25 Switch: 0.75 Q10 (5 Points) Write python code to simulate question 9.

Question10: Switch: 0.746 Stay: 0.24 (pv3)

n = 4, k = 2

The simulation is in Assignment1.py under comment #Question10