AI

LAB-10

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PRE-LAB:-

Given P(A), P(AUB), P(B).

$$P(A|B) = \frac{P(A,B)}{P(B)}$$

INLABS:-

(1) In a pack of cards we have 52 cards.

Out of which 13 are Diamonds

We have face cards = 3

(King, Queen, Jack)

Ace is not a face card.

We have to draw a diamond or a face card or both at a time that is a face card

of diamond type.

To determine the probability of drawing a diamond # of drawing = 13

To determine the probability of drawing a face card # of face cards = 12

To determine the combination of both, such as queen of diamond or Jack of diamond or king of diamond

queen of diamond = 1

king of diamond = 1

Jack of diamond = 1

We are requested to get, output as 25.0%, 23.1%, 1.9% for all 3 cases.

(2.) In this experiment / question ;

Egg → car key

Egg → Empty

Egg → Empty

Jerry chooses & host the one of the other two,

Now we need to find the probability of Jerry winning in cases :-

(1.) Staying with his choice.

(2.) Shifting his choice

The probability that the car key is in one of the golden eggs 1, 2 or 3 is

$P(1) = 1/3$, $P(2) = 1/3$, $P(3) = 1/3$.

Suppose Jerry chooses Egg-1 :-

Probability of host breaking Egg-3 conditional on where the car

key is located is:-

$P(111/1) = 1/2$ (Prob (host breaking Egg-3 given that Car key is in Egg-1).

Since Carw key is in Egg-1 Host can break Egg-2 or 3.

$P(111/2) = 1$

$P(111/3) = 0$

Now what is the probability of the car key being in Egg-2 given that Egg-3 was broken:-

We use Bayes law:-

$$P(2/111) = \frac{P(111/2)\,P(2)}{P(111/1)(P(1) + P(111/2)P(2) + P(111/3)P(3)}$$

$$= \frac{(1)(1/3)}{(1)(1/3)+(1)(1/3)+0(1/3)} = 2/3$$

Now,

Probability of car key in Egg-1

$$\Rightarrow P(1/111) = \frac{P(111/1)(P(1))}{P(111/1)(P(1) + P(111/2)P(2) + P(111/3)P(3)}$$

$$= \frac{(1/2)(1/3)}{(1/2)(1/3) + (1)(1/3) + (0)(1/3)} = 1/3$$

$\Rightarrow$ Switching the Egg is better for Jerry

O/P :- Monty Hall Problem with 3 Eggs

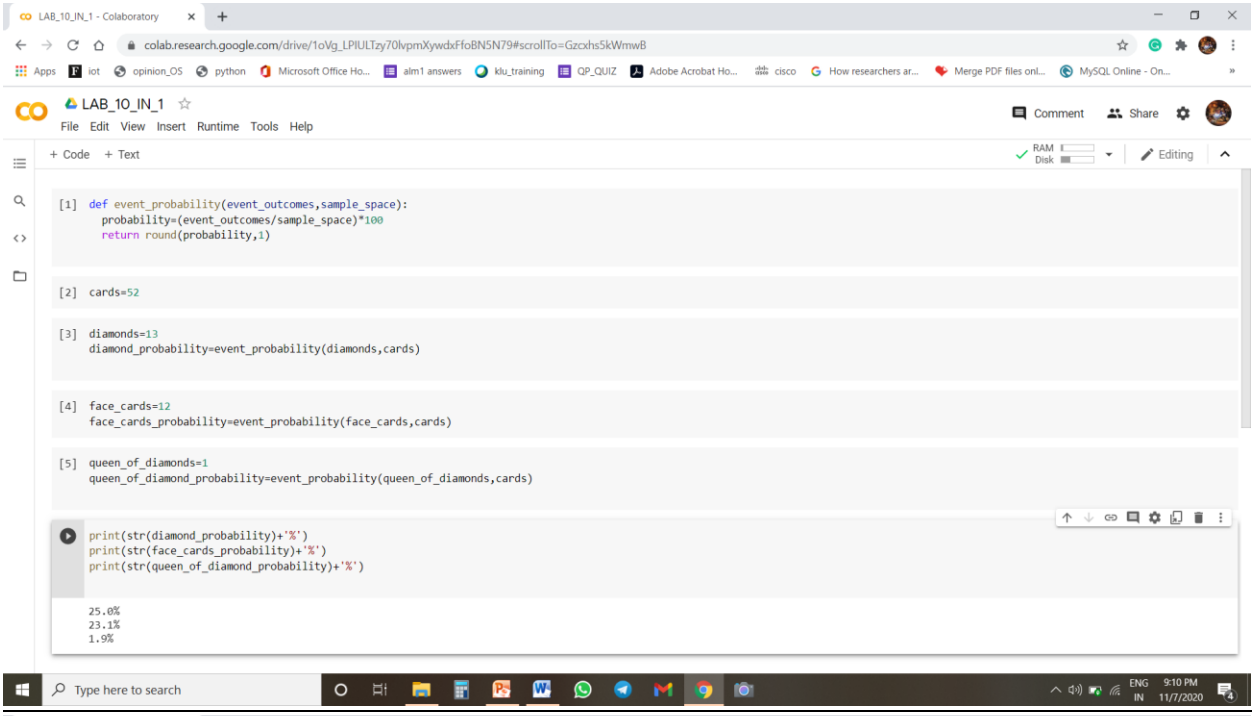
Proportion of wins without switching

: 0.3357

Proportion of wins with switching

: 0.6625.

190030117_AI_LAB_10_INLAB_OUTPUTS:Q-1,2:



LAB_10_IN_1 - Colaboratory

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LAB_10_IN_1

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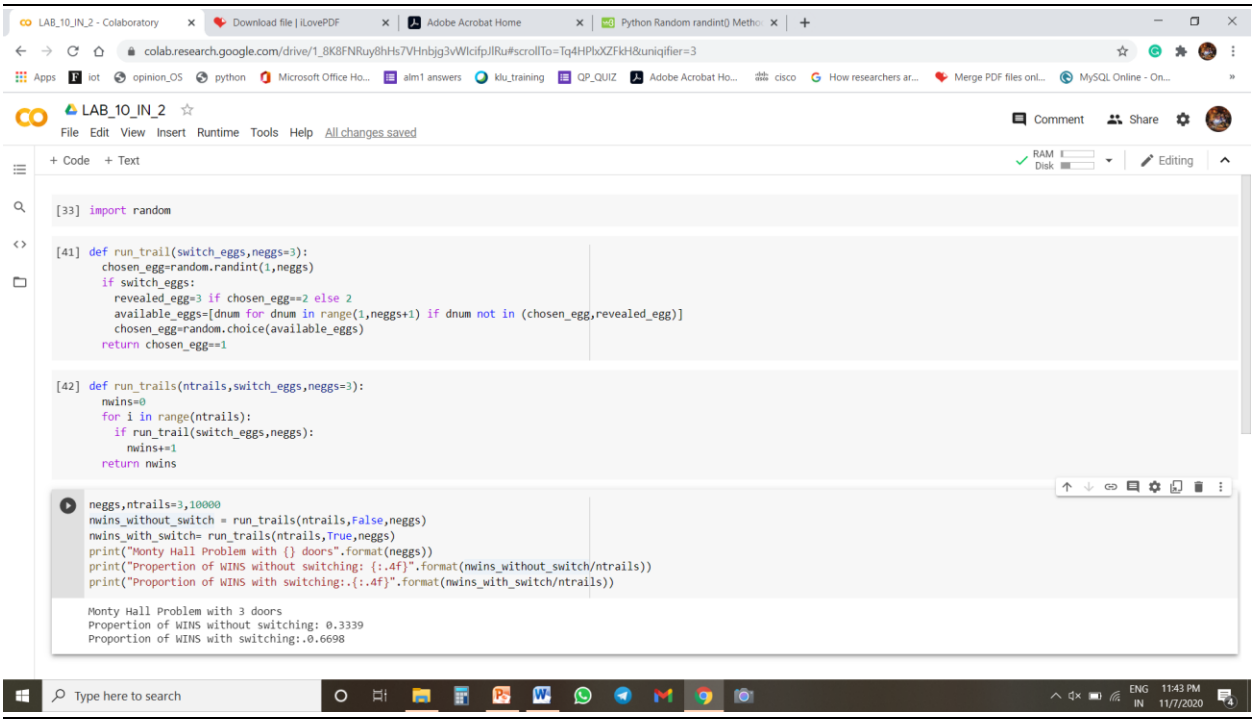
```
[1] def event_probability(event_outcomes,sample_space):
      probability=(event_outcomes/sample_space)*100
      return round(probability,1)

[2] cards=52

[3] diamonds=13
    diamond_probability=event_probability(diamonds,cards)

[4] face_cards=12
    face_cards_probability=event_probability(face_cards,cards)

[5] queen_of_diamonds=1
    queen_of_diamond_probability=event_probability(queen_of_diamonds,cards)

print(str(diamond_probability)+'%')
print(str(face_cards_probability)+'%')
print(str(queen_of_diamond_probability)+'%')
```

```
25.0%
23.1%
1.9%
```



LAB_10_IN_2 - Colaboratory

colab.research.google.com/drive/1_8K8FNRuy8hHs7VHnbjg3vWIcifpJIRu#scrollTo=Tq4HPlxXZFkH&uniqifier=3

LAB_10_IN_2

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```
[33] import random

[41] def run_trail(switch_eggs,neggs=3):
       chosen_egg=random.randint(1,neggs)
       if switch_eggs:
         revealed_egg=3 if chosen_egg==2 else 2
         available_eggs=[dnum for dnum in range(1,neggs+1) if dnum not in (chosen_egg,revealed_egg)]
         chosen_egg=random.choice(available_eggs)
       return chosen_egg==1

[42] def run_trails(ntrails,switch_eggs,neggs=3):
       nwins=0
       for i in range(ntrails):
         if run_trail(switch_eggs,neggs):
           nwins+=1
       return nwins

neggs,ntrails=3,10000
nwins_without_switch = run_trails(ntrails,False,neggs)
nwins_with_switch= run_trails(ntrails,True,neggs)
print("Monty Hall Problem with {} doors".format(neggs))
print("Propertion of WINS without switching: {:.4f}".format(nwins_without_switch/ntrails))
print("Proportion of WINS with switching:.{:.4f}".format(nwins_with_switch/ntrails))
```

```
Monty Hall Problem with 3 doors
Propertion of WINS without switching: 0.3339
Proportion of WINS with switching:.0.6698
```