MONTY HALL PROJECT

SUBMITTED BY

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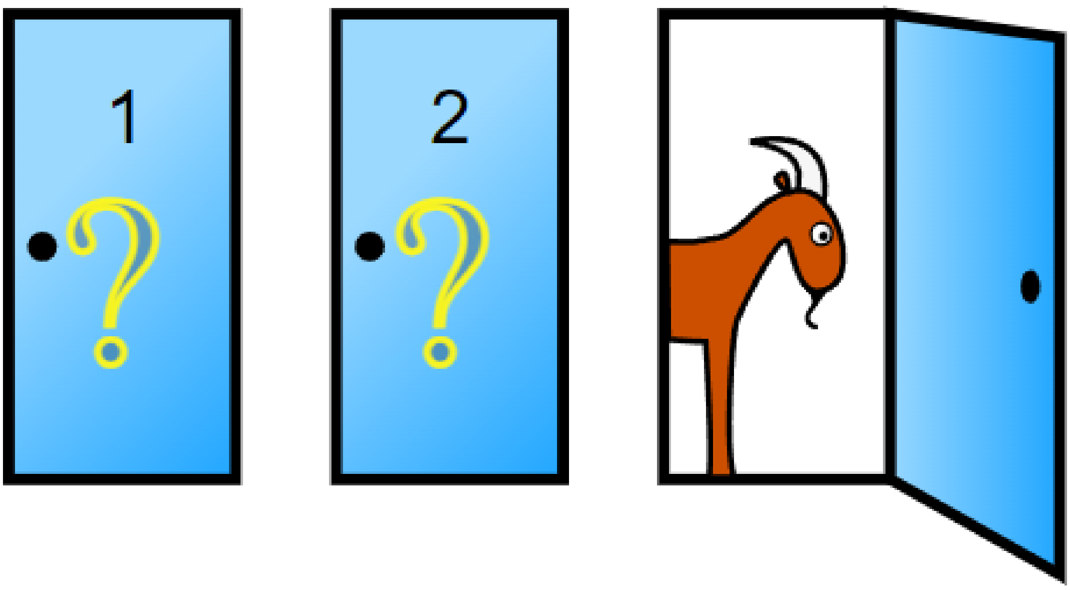
INTRODUCTION

The **Monty Hall problem** is a brain teaser, in the form of a probability puzzle, based nominally on the American television game show Let's Make a Deal and named after its original host, Monty Hall.

When the player first makes their choice, there is a 2/3 chance that the car is behind one of the doors not chosen. This probability does not change after the host reveals a goat behind one of the unchosen doors. When the host provides information about the two unchosen doors (revealing that one of them does not have the car behind it), the 2/3 chance of the car being behind one of the unchosen doors rests on the unchosen and unrevealed door, as opposed to the 1/3 chance of the car being behind the door the contestant chose initially.



LOGIC BEHIND THE GAME

A player who stays with the initial choice wins in only one out of three of these equally likely possibilities, while a player who switches wins in two out of three.

An intuitive explanation is that, if the contestant initially picks a goat (2 of 3 doors), the contestant *will* win the car by switching because the other goat can no longer be picked – the host had to reveal its location – whereas if the contestant initially picks the car (1 of 3 doors), the contestant *will not* win the car by switching. Using the switching strategy, winning or losing thus only depends on whether the contestant has initially chosen a goat (2/3 probability) or the car (1/3 probability). The fact that the host subsequently reveals a goat in one of the unchosen doors changes nothing about the initial probability.
A different selection process, where the player chooses at random *after* any door has been opened, yields a different probability.

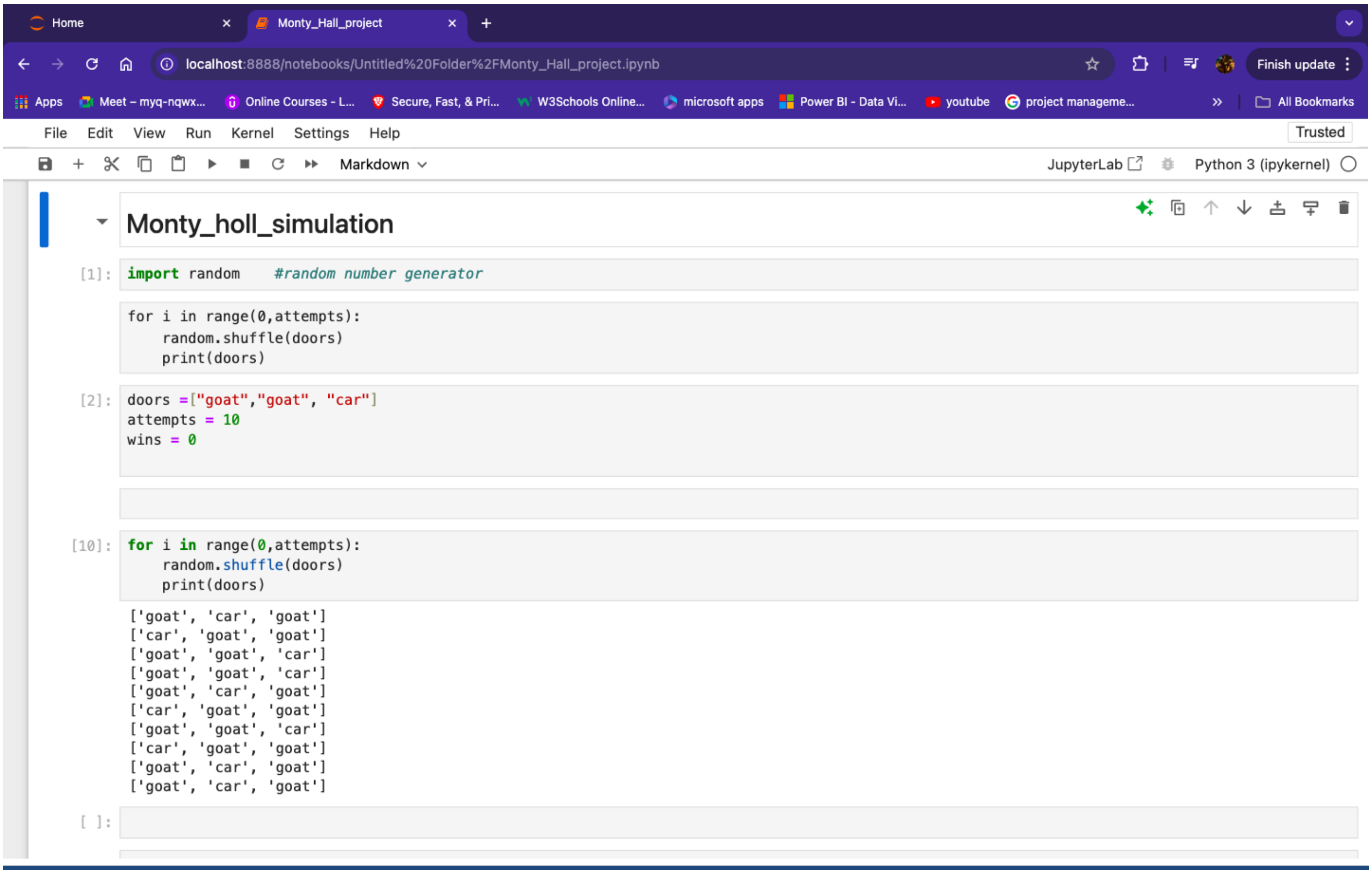
Player choice after door is open

Most people conclude that switching Does not matter, because there would be a 50% chance of finding the car behind either of the two unopened doors. This would be true if the host selected a door to open at random, but this is not the case. The host-opened door depends on the player's initial choice, so the assumption of independence does not hold. Before the host opens a door, there is a 1/3 probability that the car is behind each door. If the car is behind door 1, the host can open either door 2 or door 3, so the probability that the car is behind door 1 and the host opens door 3 is 1/3 × 1/2 = 1/6. If the car is behind door 2 – with the player having picked door 1 – the host *must* open door 3, such the probability that the car is behind door 2 and the host opens door 3 is 1/3 × 1 = 1/3. These are the only cases where the host opens door 3, so if the player has picked door 1 and the host opens door 3, the car is twice as likely to be behind door 2 as door 1. The key is that if the car is behind door 2 the host must open door 3, but if the car is behind door 1 the host can open either door.
Another way to understand the solution is to consider together the two doors initially unchosen by the player. As Cecil Adams puts it, "Monty is saying in effect: you can keep your one door or you can have the other two doors". The 2/3 chance of finding the car has not been changed by the opening of one of these doors because Monty, knowing the location of the car, is certain to reveal a goat. The player's choice after the host opens a door is no different than if the host offered the player the option to switch from the original chosen door to the set of both remaining doors. The switch in this case clearly gives the player a 2/3 probability of choosing the car.

The code shown below shows how the percentage Of win increases by switching

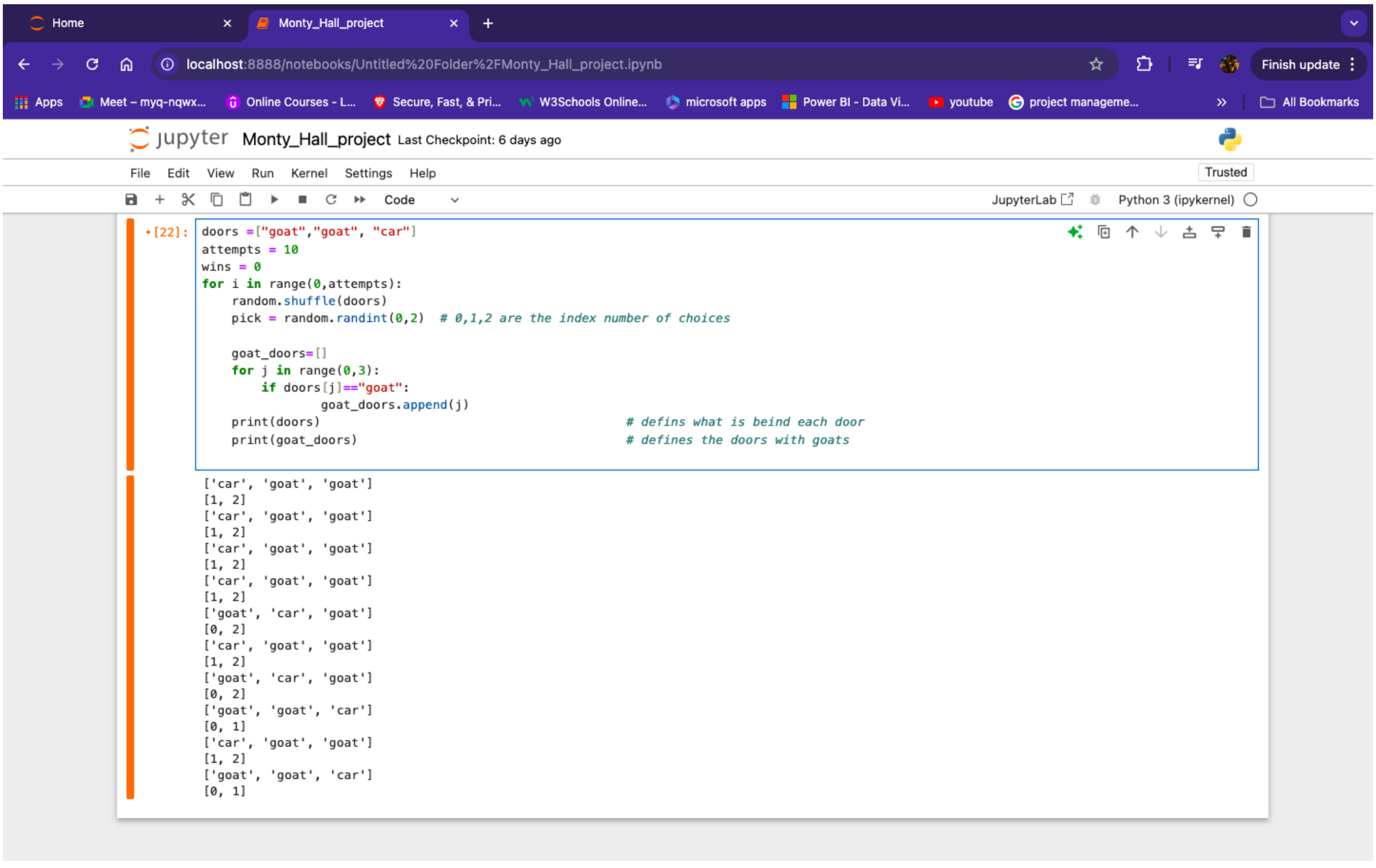
Step 1 →import random for random guess, as we have 3 have inputs (“goat”, ”car”, “goat”).

As in output we can clearly see the guessing generated by system.



Step 2 → Obtaining the position of "goat" as shown below.

So, that the host must remove the one goat from the choices left after picking one door by user.



```
doors =["goat","goat", "car"]
attempts = 10
wins = 0
for i in range(0,attempts):
    random.shuffle(doors)
    pick = random.randint(0,2)  # 0,1,2 are the index number of choices

    goat_doors=[]
    for j in range(0,3):
        if doors[j]=="goat":
            goat_doors.append(j)
    print(doors)                         # defins what is beind each door
    print(goat_doors)                    # defines the doors with goats
```

```
['car', 'goat', 'goat']
[1, 2]
['car', 'goat', 'goat']
[1, 2]
['car', 'goat', 'goat']
[1, 2]
['car', 'goat', 'goat']
[1, 2]
['goat', 'car', 'goat']
[0, 2]
['car', 'goat', 'goat']
[1, 2]
['goat', 'car', 'goat']
[0, 2]
['goat', 'goat', 'car']
[0, 1]
['car', 'goat', 'goat']
[1, 2]
['goat', 'goat', 'car']
[0, 1]
```

Step 3 → Now the output as shown below, of the code represents that if the user don't switch the probability of the card "car" is about to be 33% or near 33%.

It's because if one card is chosen by the user now the next step is done by the host that he/she remove on more card which has "goat" behind. And now user asked if he/she wants to switch or not

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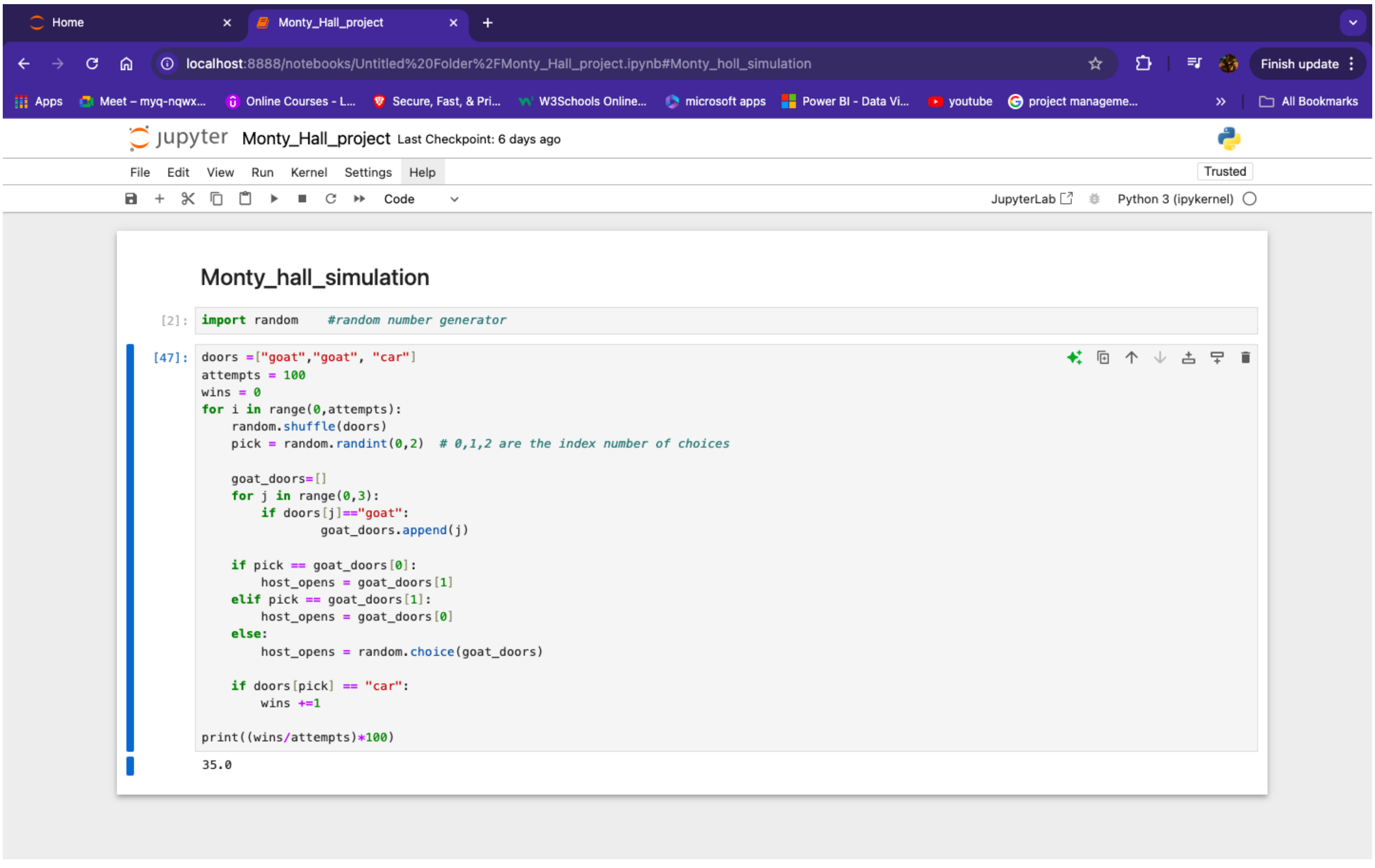
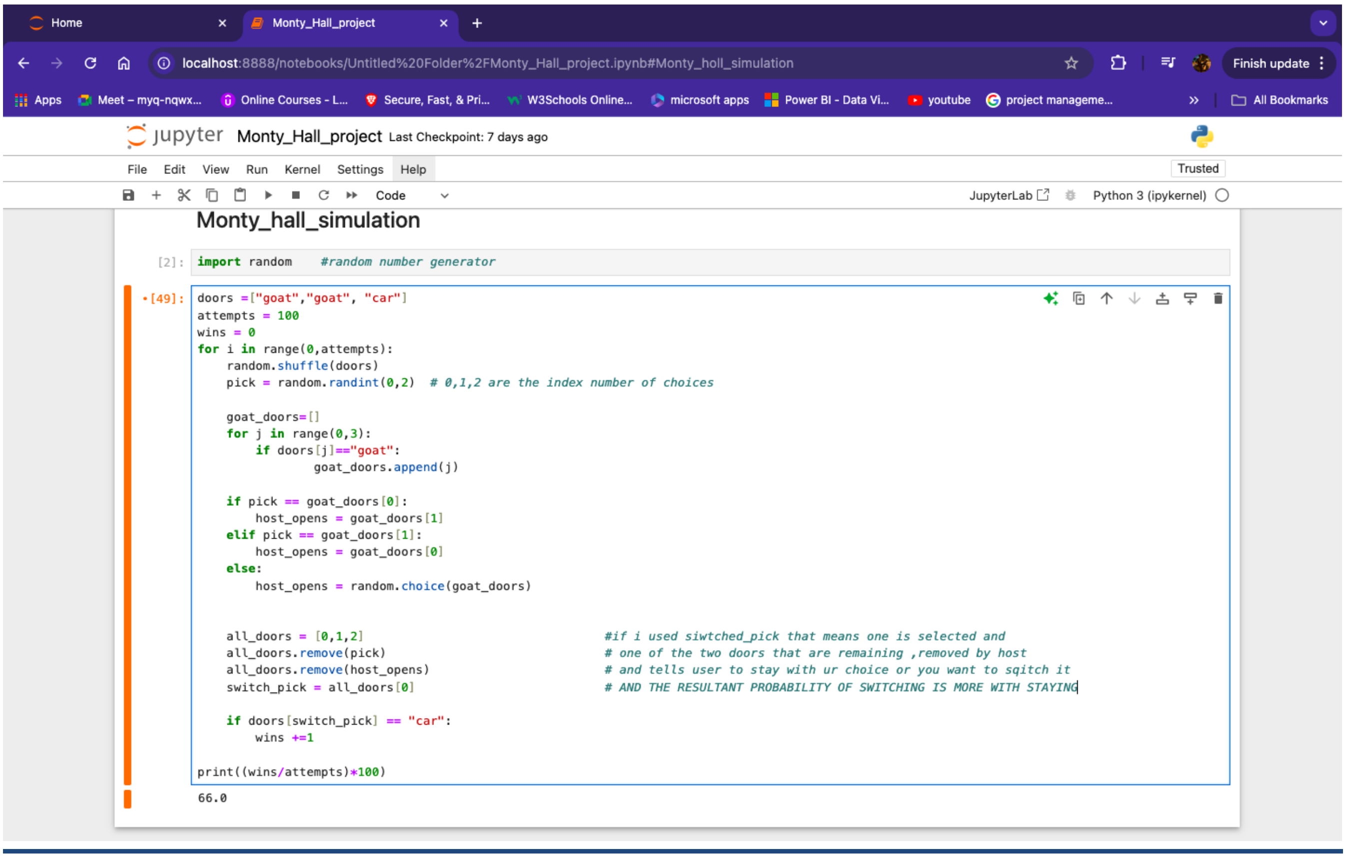


Step 4 → Now if user choose the switch option given by the host and switch his/her option and jump on another card , the possibility of card ”car” behind the card the chosen by the user after switching if now getting bigger as the attempts increases.

As you can see the output of below code clearly represents that switching increases the possibility of coming “car” as output increases.



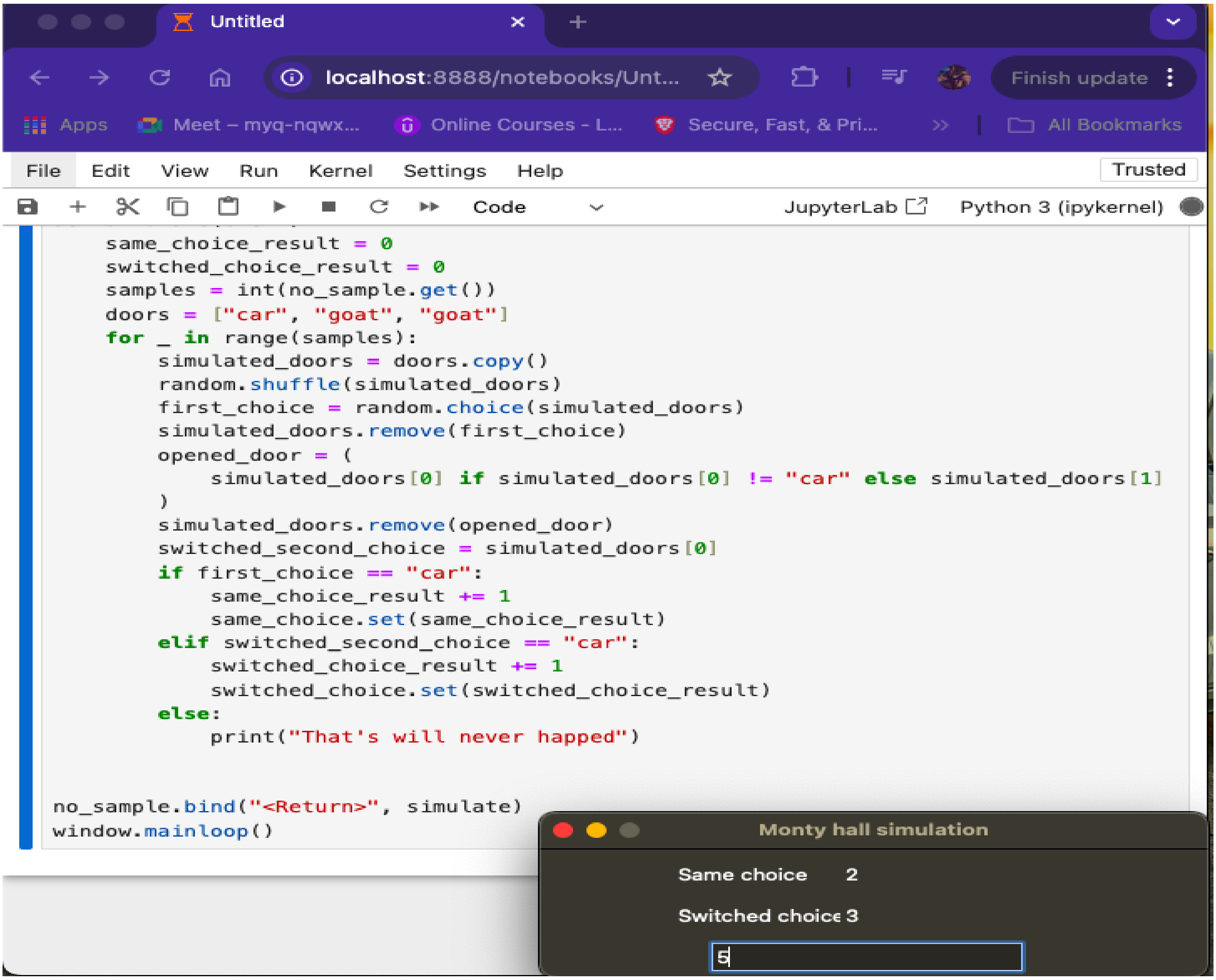
Code of the realgame that denotes the possibility of outcome after switching or stayed with same card

Now we can see that after the completion of game the output shown below in "Black window" denotes the two options:

1. **Same choice**
2. **Switched choice**

Same choice denotes that to be stayed with the choice or not whereas switched choice denotes that if he/she wants to change or not.

And the input window shows attempts it means the number of input user entered and the result decide the if you stayed with same choice " how much time you win" or if u change or switch the card "how much time you wins".




```python
    same_choice_result = 0
    switched_choice_result = 0
    samples = int(no_sample.get())
    doors = ["car", "goat", "goat"]
    for _ in range(samples):
        simulated_doors = doors.copy()
        random.shuffle(simulated_doors)
        first_choice = random.choice(simulated_doors)
        simulated_doors.remove(first_choice)
        opened_door = (
            simulated_doors[0] if simulated_doors[0] != "car" else simulated_doors[1]
        )
        simulated_doors.remove(opened_door)
        switched_second_choice = simulated_doors[0]
        if first_choice == "car":
            same_choice_result += 1
            same_choice.set(same_choice_result)
        elif switched_second_choice == "car":
            switched_choice_result += 1
            switched_choice.set(switched_choice_result)
        else:
            print("That's will never happed")


no_sample.bind("<Return>", simulate)
window.mainloop()
```

This is an example of the result/output with changing of attempts.