

**Exercise 1:** Consider the following code fragment

```
for i in range(5):  
    for j in range(2):  
        print(i*j)
```

How many times will the print statement execute?

**Exercise 2:** What output will the following code fragment produce?

```
s = 0  
while s < 3:  
    for i in range(4):  
        print(s-i)  
    s += 2  
    print("***")
```

Output:



**Exercise 3:** What will the following program output, if user enters number 15?

```
while True:  
    n = int(input("Enter a number:"))  
  
    if n != 15:  
        print("A")  
        continue  
  
    else:  
        print("B")  
        break  
print("C")
```

Output:



## Simulations

Let's simulate 100 tosses of two coins!

As you know, we have "HEADS" and "TAILS" for a coin toss.

If I toss two coins simultaneously, I can get the following outcomes:

heads heads

heads tails

tails heads

tails tails

Let's simulate 100 tosses of two coins to get the probability of getting **both heads**, the probability of getting **both tails**, and the probability of getting **a heads and a tails**.



For us, the outcomes "heads tails" and "tails heads" are the same, but for computer they are different. Therefore, we will need to take special care of it as you will see below.

Let's re-use some amount of code from the program `twoDice100Rolls.py`

1. we will use

```
import random
```

2. we need to change the dictionary, as we are interested in only three outcomes!

So replace `rolls` dictionary with the `tosses` dictionary:

```
tosses = {  
'HH' : 0,  
'HT' : 0,  
'TT' : 0 }
```

'HH' stands for both heads

'HT' stands for one head and one tail

'TT' stands for both tails

3. keep the for loop header (`for i in range(100):`), but replace the body of the loop:

let's assume that 0 will stand for heads and 1 will stand for tails.

Therefore, to get one coin toss, do

```
coin1 = random.randint(0,1)
```

Do the same for the second coin. You can name the variable `coin2`.

Next we should cover three outcomes:

(1) both coins show heads: if this is the case, we would increment the corresponding value in the dictionary tosses:

```
if coin1 == coin2 == 0: # both heads
    tosses['HH'] += 1
```

Use `elif` and `else` to cover two other cases:

Best way is to cover the (2) two tails in `elif`, and leave (3) “heads and tails”, “tails and heads” for the `else`.

Here is a sketch of the body of the loop:

```
for i in range(100): # 100 tosses!
    coin1 = random.randint(0,1)
    # put a proper statement for the coin2

    if coin1 == coin2 == 0: # both heads
        tosses['HH'] += 1

    elif coin1 == coin2 == 1: # both tails
        # put a proper statement here

    else: # one heads, one tails
        # put a proper statement here
```

4. After the for loop with 100 iterations, get rid of the `for i in range(2,13)` and its body, this is not for us! Instead, we will have a bunch of print statements:

```
print("2 coins tosses histogram:")
print("two heads: ", "*" * tosses['HH'])
# put a print statement for the two tails case
# put a print statement for the heads and tails case

print("probabilities:")
print("getting both heads:",tosses['HH']/100)
# put a print statement to display the probability of getting both
tails
# put a print statement to display the probability of getting one
tails and one heads
```

Run your program several times, see the outputs, analyze them.  
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