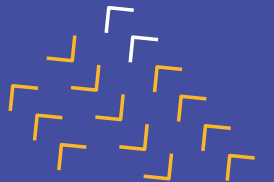
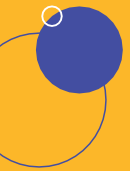


Basic Programming II - Iteration



Could You Write Quote, Related to Today Session?



"First, solve the problem. Then, write the code."

- John Johnson



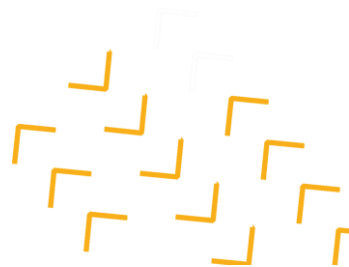
Table of Content

What will We Learn Today?

1. Introduction to Iteration or Loop
2. Flowchart of loop
3. While loop
4. For loop
5. Multiple loop



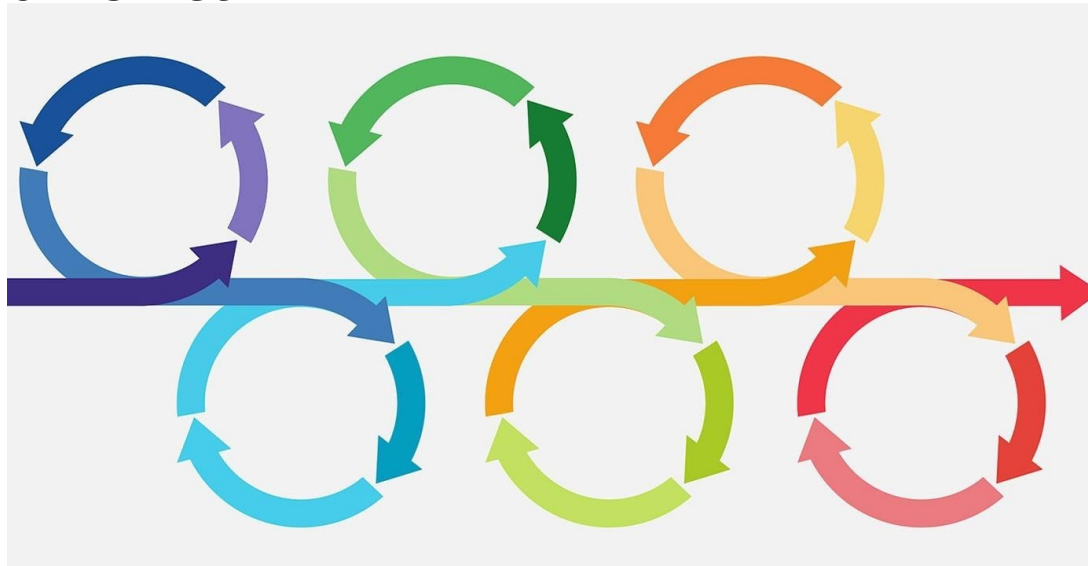
Introduction to Iteration & Loop





Iteration or Loop

- The repetition of a process in order to generate an outcome
- There are two types of iteration:
 - **Definite iteration**, in which the number of repetitions is specified explicitly in advance
 - **Indefinite iteration**, in which the code block executes until some condition is met



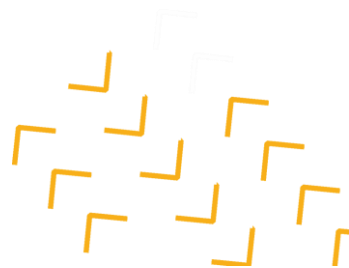


Let's play!

For {subject } **in** {iterable thing }:
 {you guys take an action }

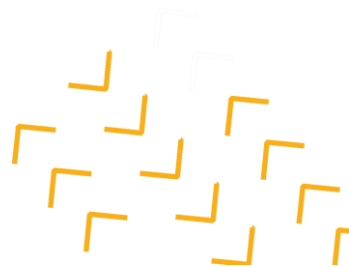
or

While {condition is not true }
 {you guys keep in actions }





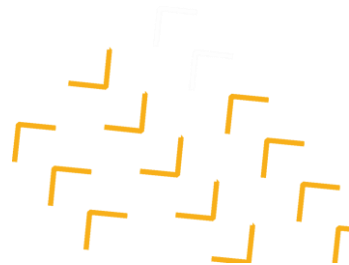
For student in data science class :
write "hi!"





Let's play!

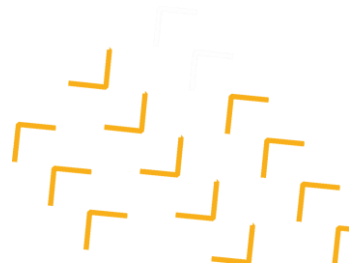
```
For num in range 1- 10 :  
    write num
```





Let's play!

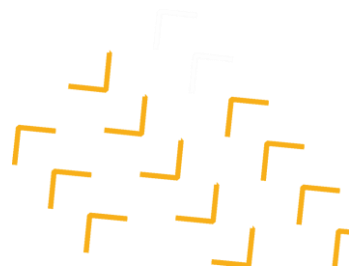
```
For num in range 1- 10 :  
    write num +2
```





Let's play!

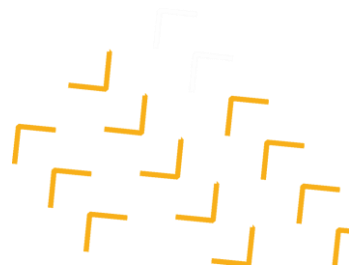
```
For num in range 1- 10 :  
if num is odd: write "hi!"  
    else write "hello!"
```





Let's play!

```
num =0
while num less than 10:
    num =num+2
    write num
```



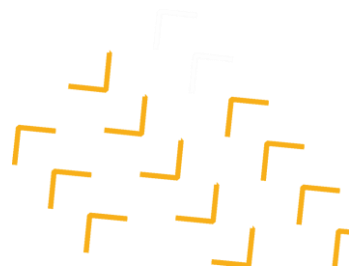
So, the question is ...

What is the difference between

```
num =0
while num less than 10:
    num =num +2
    write num
```

and

```
num =0
while num less than 10:
    write num
    num =num +2
```

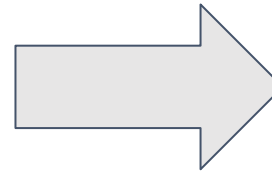


Answer

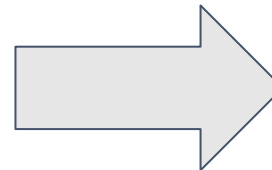
```
num =0  
while num less than 10:  
    num =num +2  
    write num
```

and

```
num =0  
while num less than 10:  
    write num  
    num =num +2
```



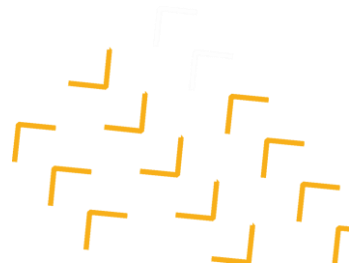
2, 4, 6, 8, 10



2, 4, 6, 8

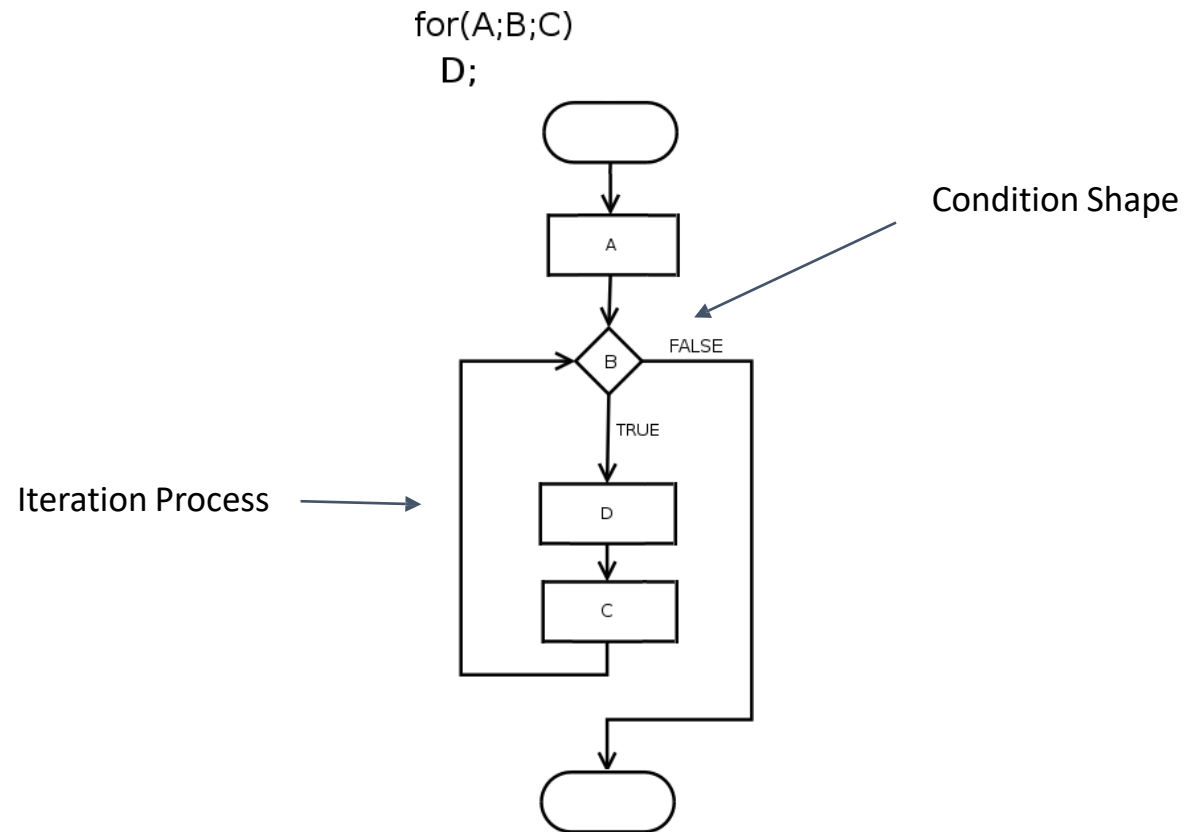
Result

Flowchart of iteration

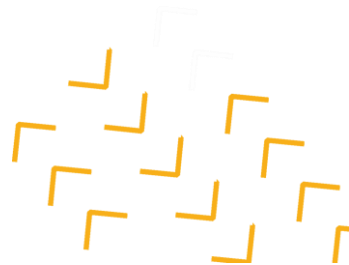




Flowchart of Condition

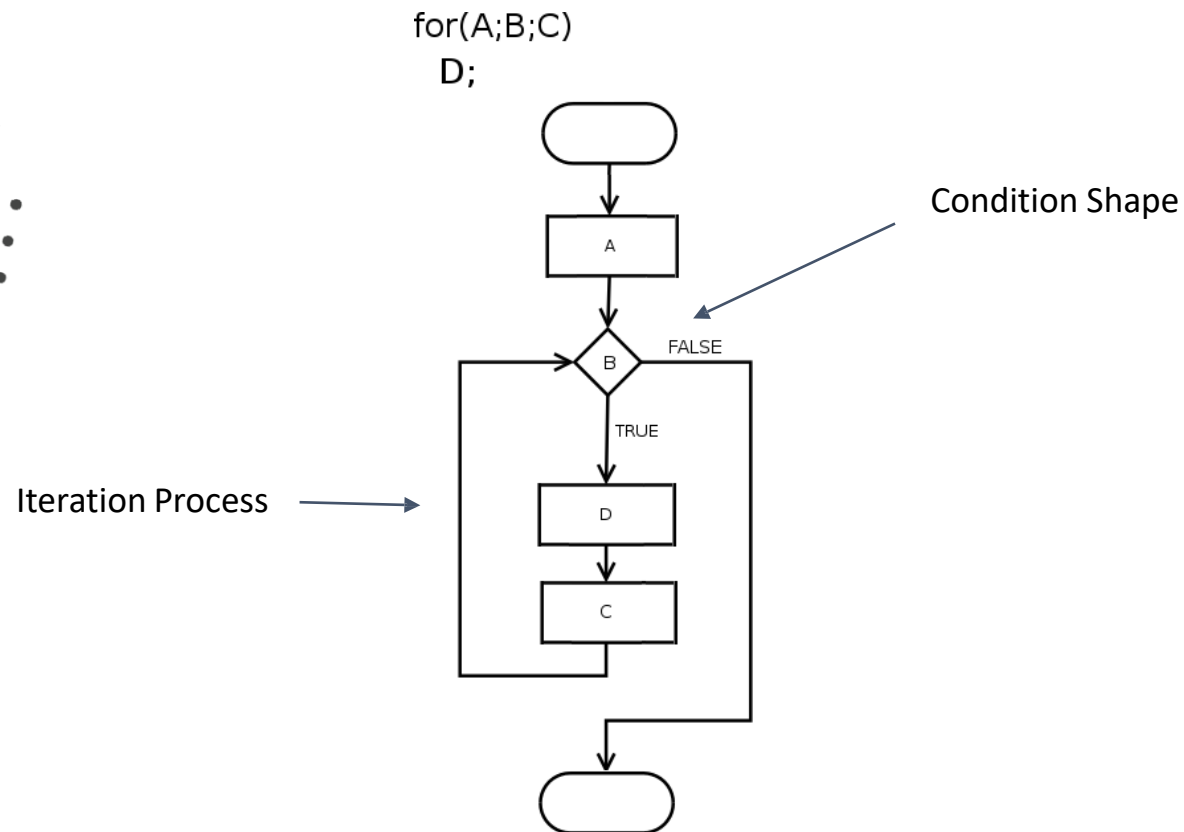


https://en.wikipedia.org/wiki/Flowchart#Building_blocks





There is condition on the flow, but how?



For {subject } **in** {iterable thing }
{you guys take an action }



or

While {condition is true }
{you guys keep in actions }

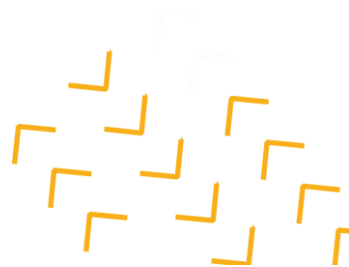


So, this is the condition

Condition

For {subject } **in** {iterable thing }
{you guys take an action }

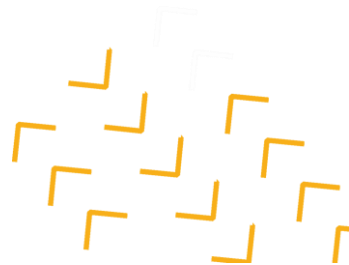
Let's code!





While Loop - Indefinite iteration

```
while {expression}:  
    {statement + increment or decrement}
```





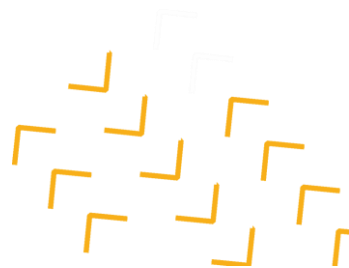
While Loop - Indefinite iteration

Initiate variables:

```
a = 1
```

Example 1:

```
while a < 10:  
    print(a)  
    a = a + 1
```

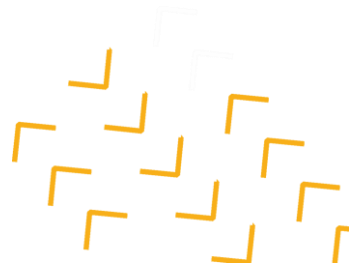




While Loop - Indefinite iteration

Case 1:

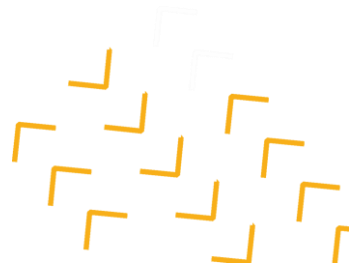
A = 1, result print out the *odd numbers* until 20





For Loop - Definite iteration

```
for {var} in {iterable}:  
    {statement}
```

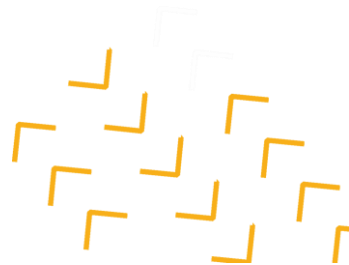




For Loop - Definite iteration

Example 1:

```
for a in range(1,10):  
    print(a)
```





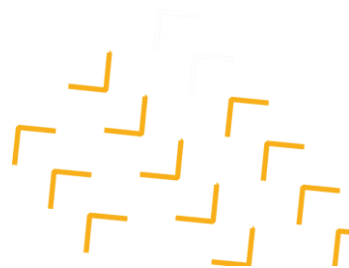
For Loop - Definite iteration

Case 1:

A = 1, result print out the *odd numbers* until 20

Case 2:

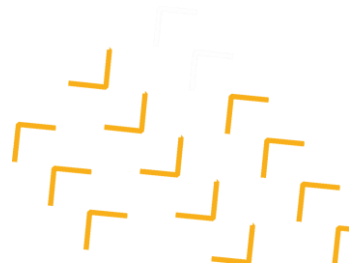
Print out the star or (*) or asterisk in right angel





Multiple Loop

```
for {var 1} in {iterable 1}:  
    for {var 2} in {iterable 2}:  
        {statement 2}  
    {statement 1}
```

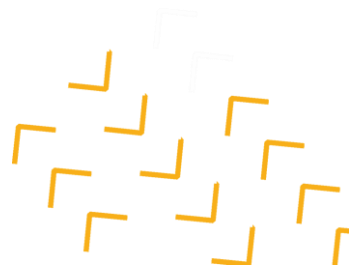




Multiple Loop

Example 1:

```
for a in range(1,10):  
    for b in range(10,20):  
        print(a+b)
```



Multiple Loop

Case 1:

Write a code to print a picture like this

```
*  
**  
***  
****  
*****
```