4. Statements and Loops

PYTHON COURSE

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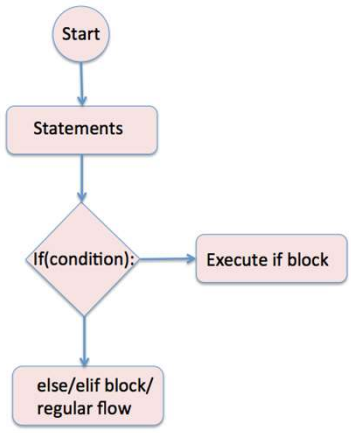
Conditional Statement

1. Conditional statement in Python refers to **"if….else".**

2. There can be many **elif** but only one **else**.

```
2  if main_condition:
3      ...
4  elif second_condition:
5      ...
6  else:
7      ... #do this otherwise
```



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If statement example

```
1 x=input("Give me a integer \n")
2 x=int(x)
3 if x<2:
4     print("x is smaller than two")
5 elif x>30:
6     print("x is bigger than 30")
7 else:
8     print("x is between 2 and 30")
9
```

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While loops

1. While a **condition is True**, repeat the task.

```
1 while condition:
2     ...
3     condition=False
```

2. Using while loops without giving it a termination condition can end up in an infinite loop. This causes your program to never end.

3. In the case of infinite loop: press Ctrl+C

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While loop example

```
#print 1 to 49
i=1
while i<50:
    print(i)
    i=i+1

#another way
condition=True
i=1
while condition:
    print(i)
    i=i+1
    if i>49:
        condition=False
```

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For loops

1. For loops are used for iteration within a sequence (list, dict, set, str).

2. The syntax is:

```
for element in sequence:
    ...  #do this for all elements
```

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For loop example

```
2  print("list")
3  for i in [1,2,3,4,5]:
4      print(i)
5
6  print("range")
7  for i in range(6,10):
8      print(i)
9
10 print("tuple")
11 for i in (10,11,12,13,14,15):
12     print(i)
13
14 print("set")
15 for i in {19,18,17,16,20}:
16     print(i)
```

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Challenge 1: Calculate pi by Leibniz formula

$$\frac{\pi}{4} = \sum_{k=0}^{\infty} \frac{(-1)^k}{2k+1}$$

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Other methods for Pi (HOMEWORK)

$$\lim_{n\to\infty} \frac{1}{n^2} \sum_{k=1}^{n} (n \bmod k) = 1 - \frac{\pi^2}{12}$$

$$\pi = \sum_{k=0}^{\infty} \left[\frac{1}{16^k} \left(\frac{4}{8k+1} - \frac{2}{8k+4} - \frac{1}{8k+5} - \frac{1}{8k+6} \right) \right]$$

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Challenge 2: Nested Loops

You have a list in list **X=[[1,2,3],[4,5,6],[7,8,9],[10,11,12]]**

If the element of X is even, replace it as “even”

If the element of X is odd, replace it as “odd”

However, if the element of X is a multiple of 3, do not change it.

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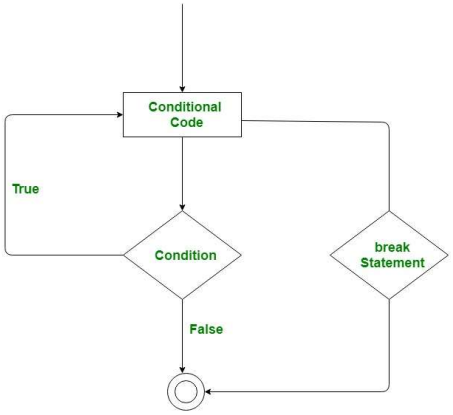
Break statement

1. A break statement sends the execution of the code directly to the end.



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Break function example

```
1  for i in range(1,100):
2      print(i)
3      if i==49:
4          break
```

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Break statement exercise

Find the first number divisible by 11 and 13.

Return 0 if this number is larger than 1000.

Use break function.

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Continue vs Pass Statement

1. Both pass and continue are used to write empty statements
2. **Continue** proceeds in the next iteration of the loop
3. **Pass** repeats the current iteration and proceeds

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Continue vs Pass Example

```
1  list=[1,2,3,4,5,6,7,8,9,10]
2
3  for i in list:
4      if i==7:
5          print("pass")
6          pass
7      print(i)
8
9
10 print("Now we try using continue")
11 for i in list:
12     if i==7:
13         print("continue")
14         continue
15     print(i)
```

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Challenge 2: Sorting a list manually

You have a list x=[14,23,4,2,9,13]

Write a nested loop to sort the list with number from small to big.

Do not use built-in functions (e.g. sort or converting it to set)

You are allowed to use the *len* function to count the elements.

Bubble sort: https://www.youtube.com/watch?v=nmhjrI-aW5o

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Challenge 3: Find the second largest number in a list

You are given a list, X=[16,1,2,3,4,5,6,7,8,11,12,13,14,15]

Find the second largest number.

Do not use built-in function.

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HOMEWORK: Find the largest number (with condition)

You have a list in list X=[[2,3,4] , [7,8,9], [4,5,6], [10,11,12]]

Find the largest number which is not divisible by 4 and not a prime number.

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Conclusion

1. Conditional Statement
2. If statement
3. While loops
4. For loops
5. Summation Example
6. Nested Loops
7. Break statement
8. Continue vs Pass Statement
9. Sorting Algorithm
10. Finding the maximum

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