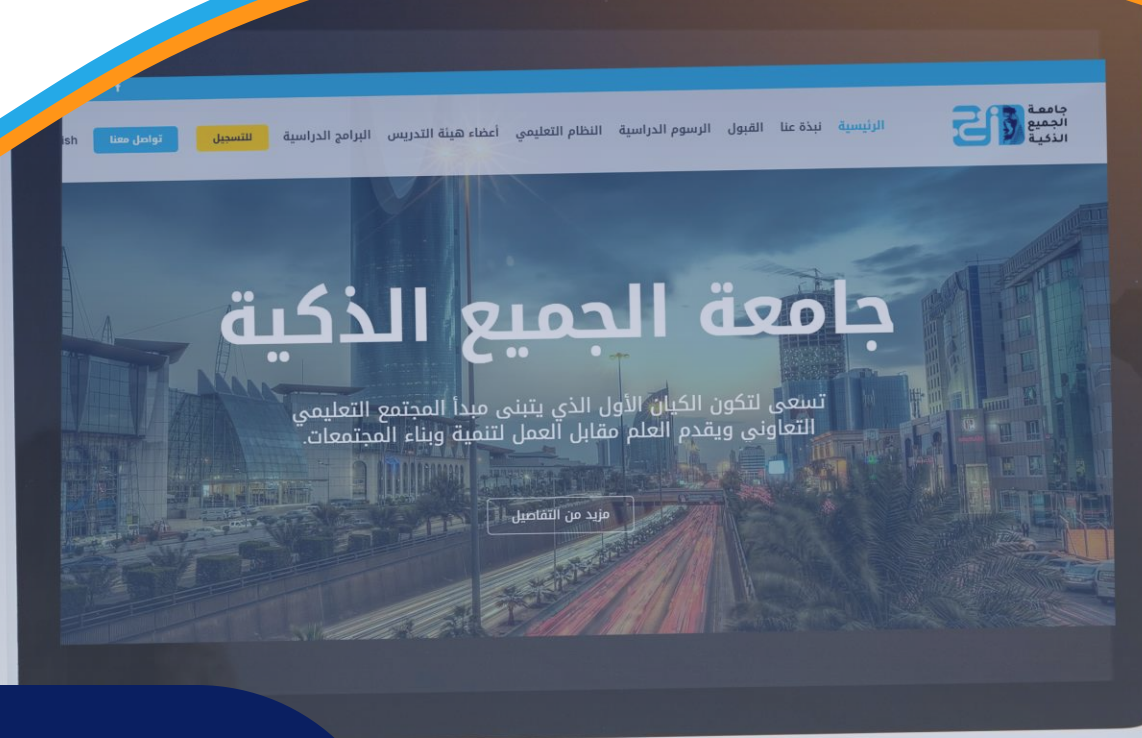




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Control and Iteration Statements
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Lecture 3

CYB550
Programming Foundations In
Python

- Variables receive their initial values and can be reset to new values with an **assignment statement**.
 - Variable defining/initializing
 - Variable references.

`<var_name> = <expr>`

- Expressions provide an easy way to perform operations on data values to produce other data values.
- An **arithmetic expression** consists of operands and operators.
 - Operators:
 - -, *, /, +

- Rule of **priority**, that is some operator has highest priority than others.
 1. `()`
 2. `**`
 3. Unary operator
 4. `*`, `/`, `//`, `%`
 5. `+`, `-`
- Rule of **associativity**, evaluate expression of similar priority from left to right.
 - Ex: `2+5-1`

- Almost all programs interact with the user through giving data to the program to process it and display other data.
 - Use the input() function.
 - input()
 - input("Enter your name: ")
 - name = input("Enter your name: ")
 - Age = int(input("Enter your Age: "))

Lecture 2 (cont'd)

SIMPLE CALCULATOR IN PYTHON

```
Num1 = input("Enter the first number: ")  
Num2 = input("Enter the second number: ")  
  
Result = Num1 + Num2  
  
print(Result)
```

- Write a program that reads a three-digit number, separates this number into its individual digits and print them. Ex: 234 -> 2 3 4
 - Code for help:

```
Number = 234
```

```
Digit1 = Number // 100
```

```
New_number = Number % 100
```

```
print("First digit = ", Digit1)
```

```
print("New number after removing the first digit = ", New_number)
```

- Write a program which inputs a temperature reading expressed in Fahrenheit and outputs its equivalent in Celsius, using the formula:

$$^{\circ}\text{C} = 5/9 (^{\circ}\text{F} - 32)$$

- Code for help:

```
Temp_fah = float(input("Enter a temperature in Fahrenheit: "))
```

```
Temp_cel = 5/9 * (Temp_fah - 32)
```

```
print("The equivalent Celsius temperature = ", Temp_cel)
```

- Control the program flow.
- Relational operators and comparison expressions.
- Selection statements.
- Iteration statements.

- **Boolean data type** consists of two values: true and false

COMPARISON OPERATOR	MEANING
==	Equals
!=	Not equals
<	Less than
>	Greater than
<=	Less than or equal
>=	Greater than or equal

- Code to know boolean types:

```
print (15 > 3)   print (15 < 3)   print(15 == 15)
```

```
x1 = 5  y1 = 5
```

```
x2 = 'Hello'  y2 = 'Hello'
```

```
x3 = [1, 2, 3]  y3 = [1, 2, 3]
```

```
print(x1 is not y1)
```

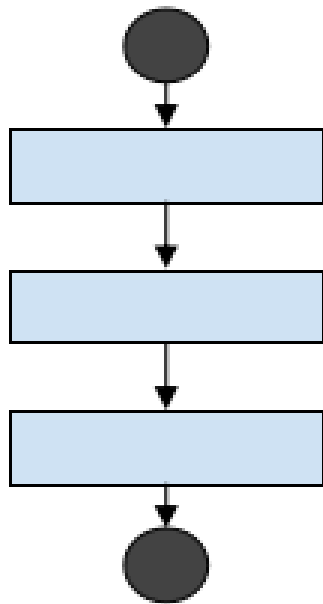
```
print(x2 is y2)
```

```
print(x3 is y3)
```

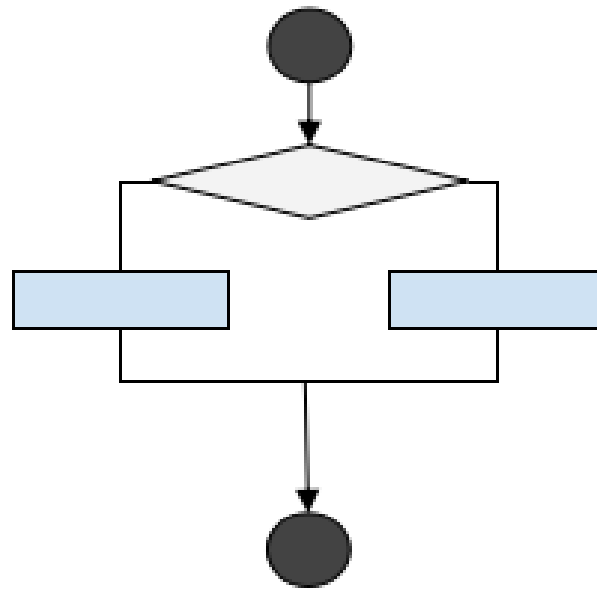


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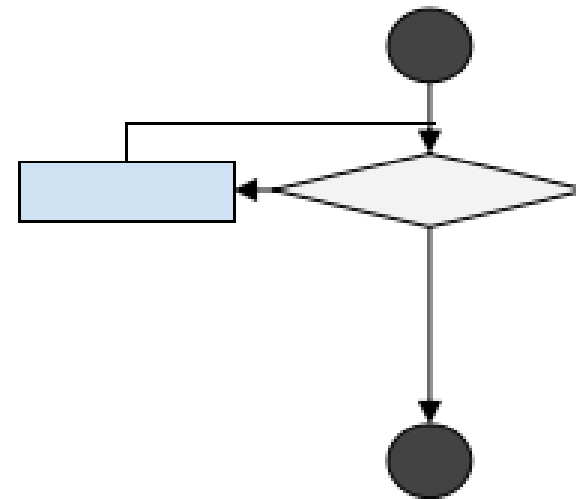
PROGRAM FLOW



Sequential



Conditional

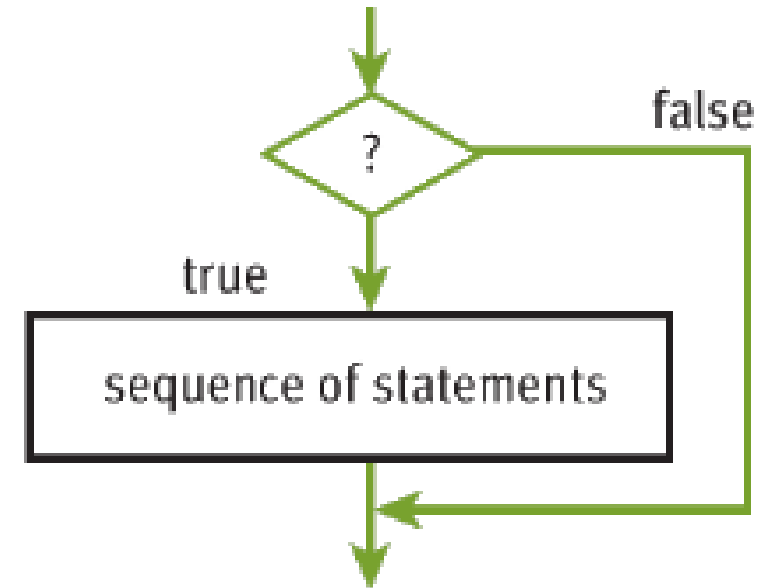


Looping

- Basic-selection statement (if statement).

- Syntax

if <condition>:
 <statement(s)>



- Two-way selection statement (if else statement).

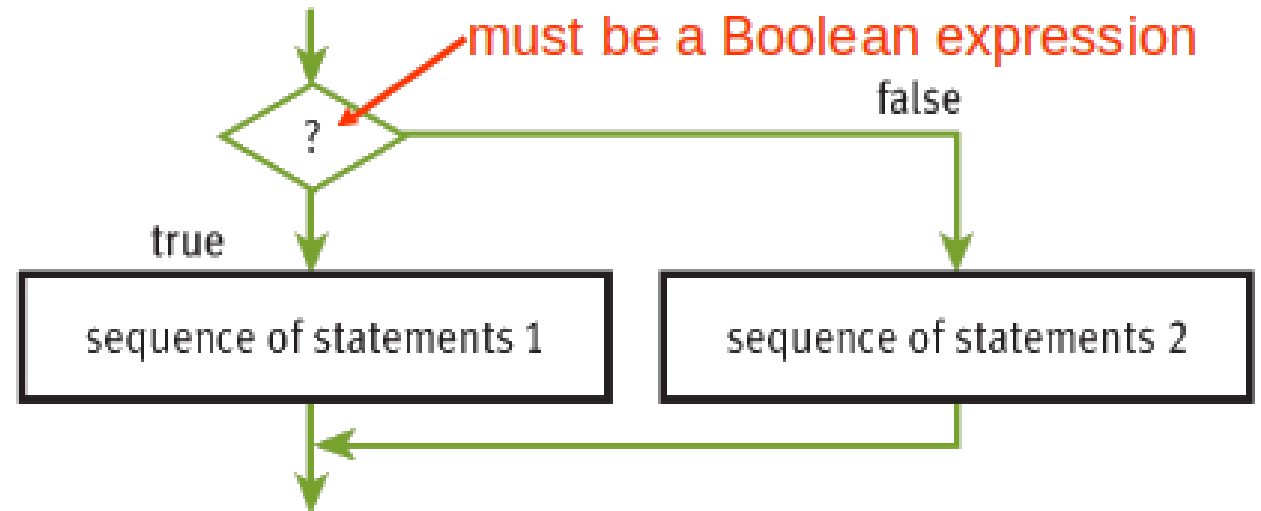
- Syntax

if <condition>:

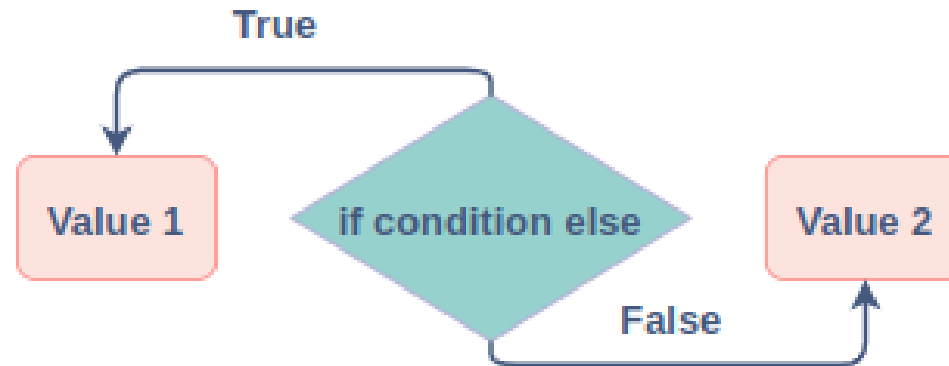
<true statement(s)>

else:

<false statement(s)>



- Ternary operator (if else statement).
 - Syntax
<variable> = <true statement> **if** <condition> **else** <false statement>



- Multi-way selection statement (if elif statement).

- Syntax

if <condition1>:

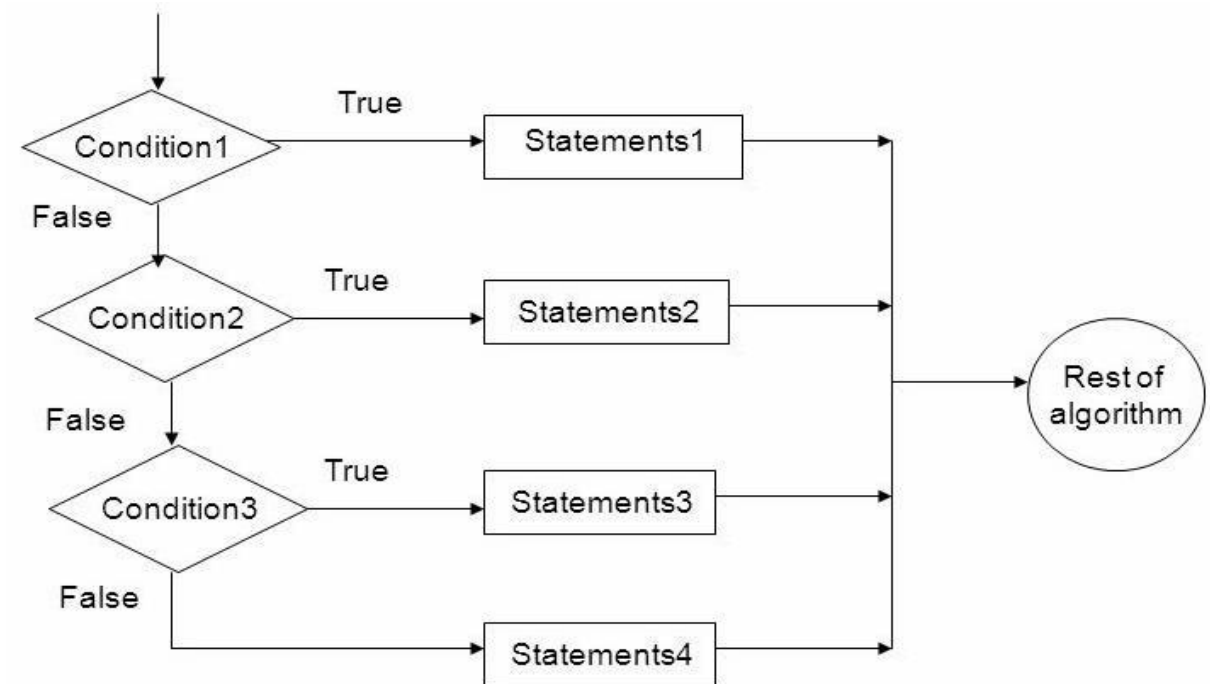
<true cond1_statement(s)>

elif <condition2>:

<true cond2_statement(s)>

else:

<otherwise statement(s)>



- Write a program which inputs a person's height (in cm) and weight (in kg) and outputs one of the messages: underweight, normal, or overweight, using the criteria:
 - Underweight: $\text{weight} < \text{height}/2.5$
 - Normal: $\text{height}/2.5 \leq \text{weight} \leq \text{height}/2.3$
 - Overweight: $\text{height}/2.3 < \text{weight}$

- Write a program to calculate the roots for the following equation:
 $ax^2 + bx + c = 0$
 - Help:
 - Use sqrt function in cmath module/package.
 - If $d > 0$ then there are two real roots.
 - If $d == 0$ then there are two equal real roots.
 - If $d < 0$ then there is no roots.

- Write a program that accepts the sides (a, b, c) of a triangle and calculates and display its area.
 - Help:

1. Work out $s = \frac{a+b+c}{2}$

2. Area = $\sqrt{s(s-a)(s-b)(s-c)}$

- Write a program that accepts the sides (a, b, c) of a triangle and calculates and display its area.
 - Code for help:

```
a = float(input('Enter first side: '))
b = float(input('Enter second side: '))
c = float(input('Enter third side: '))
s = (a + b + c) / 2
area = (s*(s-a)*(s-b)*(s-c)) ** 0.5
print("The area of the triangle = ", area)
```

Lecture 3

COMPOUND BOOLEAN EXPRESSIONS

Logical operators

A	not A
True	False
False	True

A	B	A and B
True	True	True
True	False	False
False	True	False
False	False	False

A	B	A or B
True	True	True
True	False	True
False	True	True
False	False	False

- Write a program that check of a given number is divided by 3 and 4.

- Code for help:

```
Num = int(input())
```

```
if Num % 3 == 0 and Num % 4:
```

```
    print("The number is divided by both 3 and 4")
```

```
elif Num % 3 == 0 or Num % 4:
```

```
    print("The number is divided by either 3 or 4")
```

```
else:
```

```
    print("The number is not divided by any of 3 or 4")
```



- Write a program that check if a single digit integer is a positive or negative.

- Code for help:

```
x = int(input("Enter a single digit number: "))
```

```
if x < 0 and x < 10:
```

```
    print("This number is a single digit positive number")
```

```
elif x < 0 and x > -10:
```

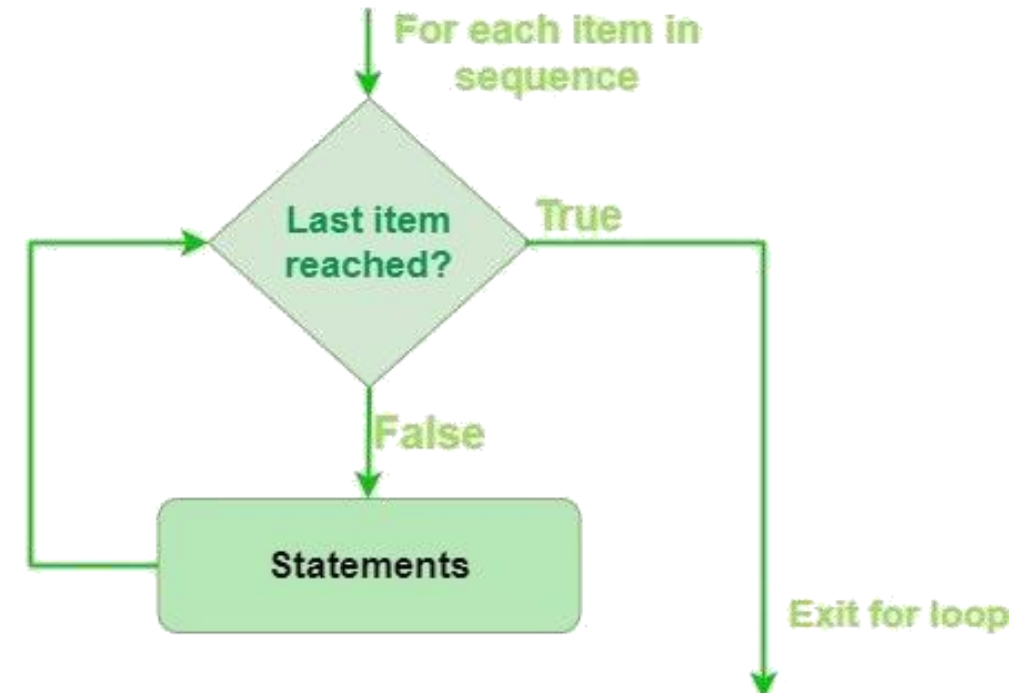
```
    print("This number is a single digit negative number")
```

```
else:
```

```
    print("Invalid integer")
```



- For loop.
 - Syntax
for <variable> **in** <sequence> :
 <statement 1>



- Write a program that reads the number of students in a class then reads their marks and finds and displays the average.

- Code for help:

```
stdCount = int(input("Enter number of students in a class"))
```

```
sum = 0.0
```

```
for i in range(stdCount):
```

```
    mark = float(input("Enter mark: "))
```

```
    sum += mark
```

```
print("The marks average = ", sum / stdCount)
```



- Write a program that calculates the total of the following series of numbers:
 $1/30 + 2/29 + 3/28 + \dots + 30/1$

- Code for help:

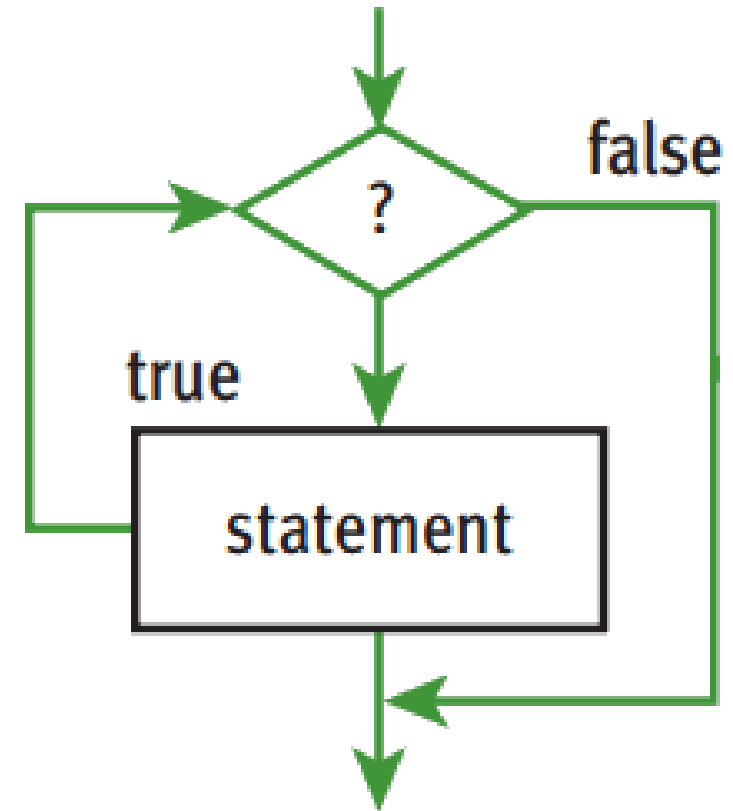
```
min = 1;  max = 6;  sum = 0.0
```

```
for i in range(min, max):
```

```
    sum += min / (max-1);    min += 1;    max -= 1
```

```
print(sum)
```

- While (entry-control) loop.
 - Syntax
while <condition>:
 <statement 1>



- Write a program that calculates the average of a set of temperature. Data is terminated by the value 999.

- Code for help:

```
sum = 0.0;    count = 0
```

```
temp = float(input("enter a temperature "))
```

```
while temp != 999:
```

```
    count += 1;    sum += temp
```

```
    temp = float(input("enter another temp"))
```

```
print("temperature average = ", sum/count)
```



- Write a program that print each character of a given string from the end.

- Code for help:

```
s = "Hello"
```

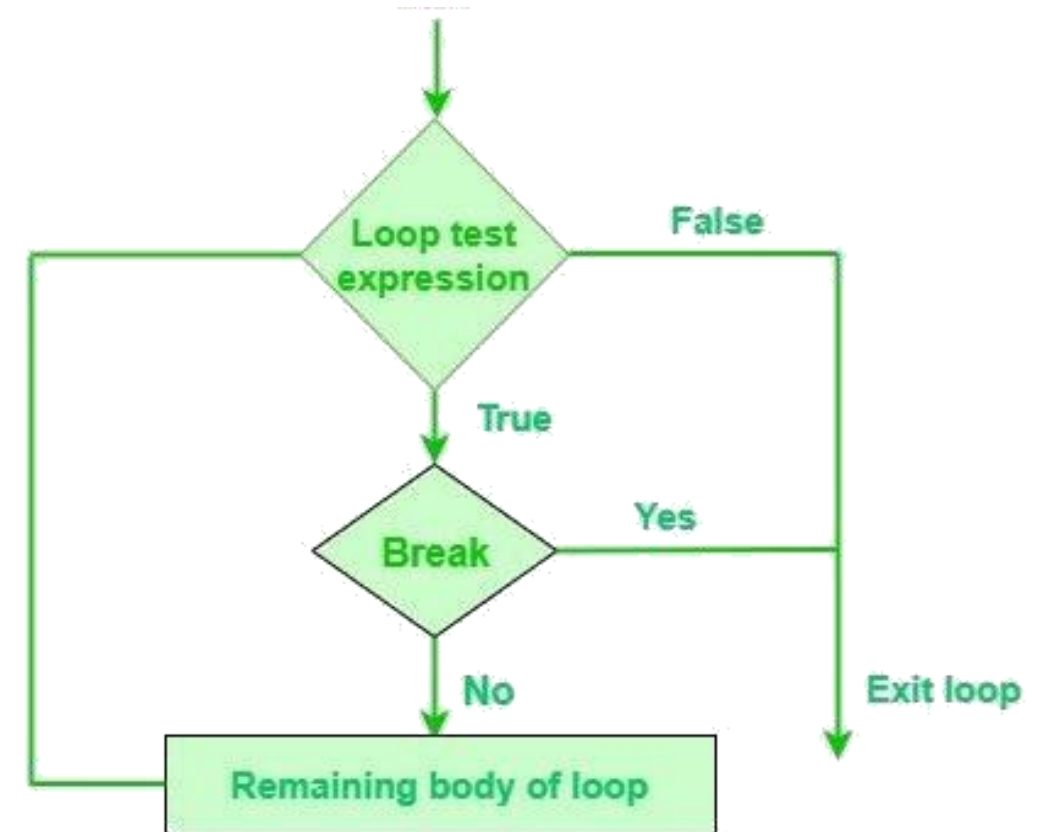
```
l = len(s)
```

```
while l > 0:
```

```
    print(s[l-1])
```

```
    l -= 1
```

- Break statement.
 - Syntax
- while** <condition>:
 <statement 1>
if <condition>:
 break

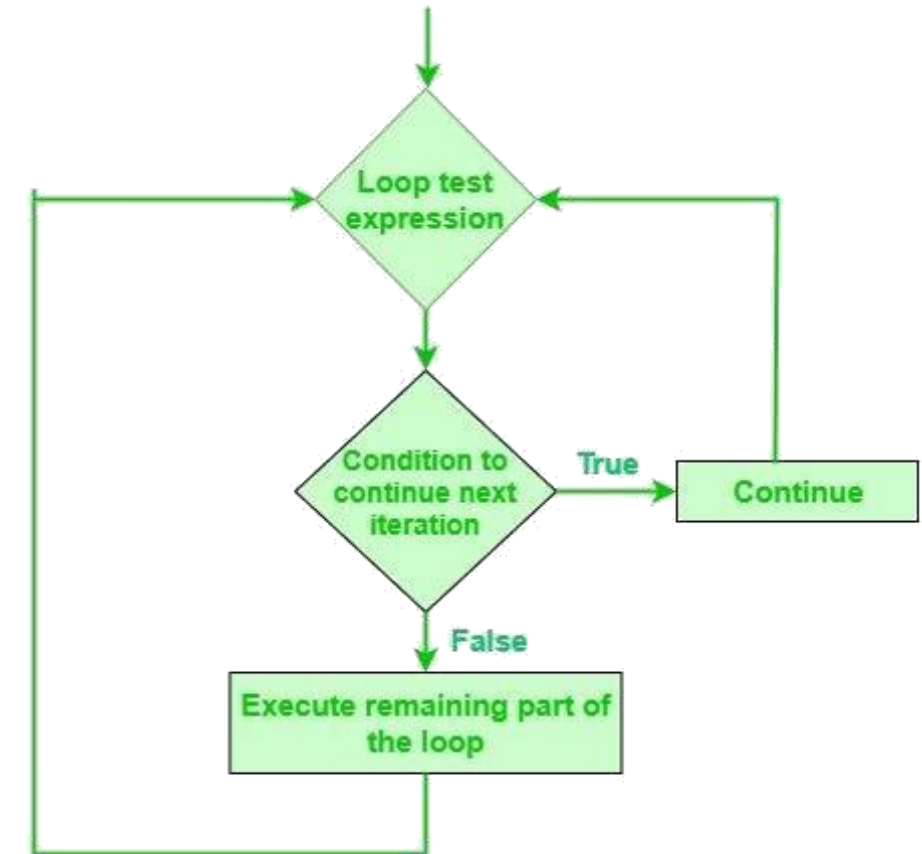


- Write a program to print numbers from 1 to 10. The program may stop in 5.

- Code for help:

```
count= 0
while count < 10:
    if count == 5
        break
    print(count)
    count += 1
```

- Continue statement.
 - Syntax
- while** <condition>:
 <statement 1>
if <condition>:
 continue



- Write a program to print numbers from 1 to 10 except 5.

- Code for help:

```
count= 0
```

```
while count < 10:
```

```
    if count == 5
```

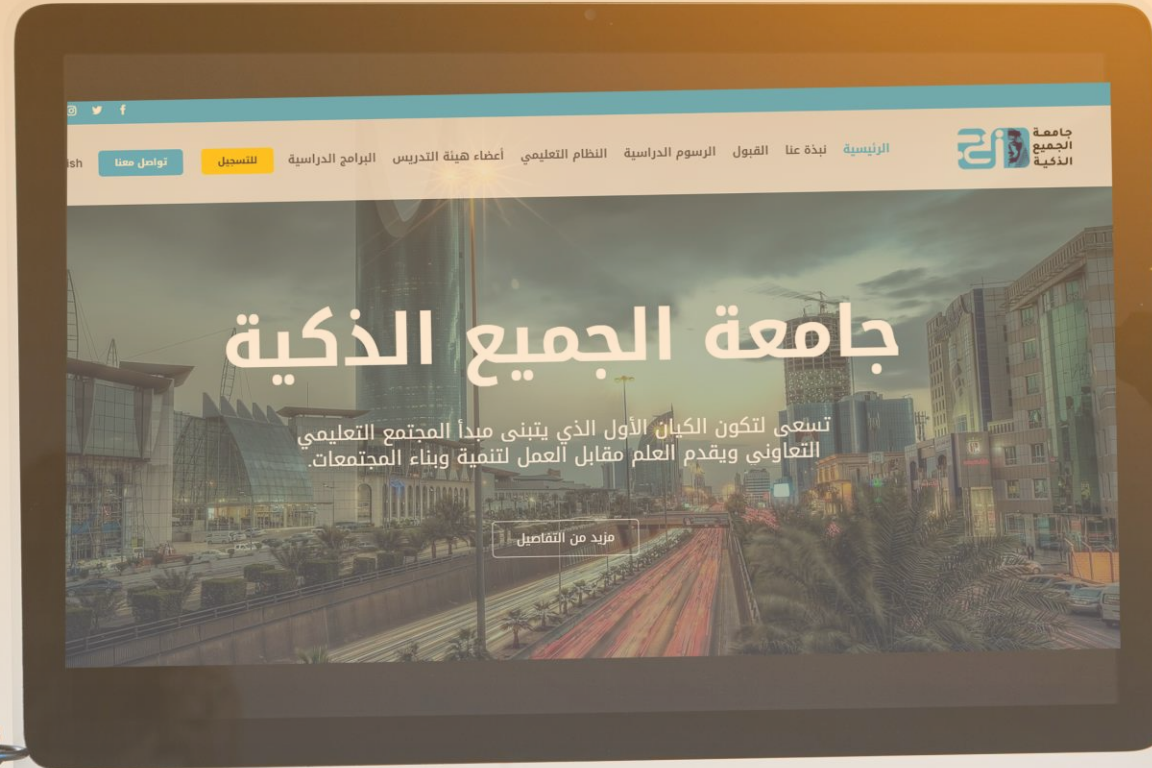
```
        continue
```

```
    print(count)
```

```
    count += 1
```



- Write a program that calculates the occupancy rate for a hotel. The program should start by asking the user how many floors the hotel has. A loop should then iterate once for each floor. In each iteration, the loop should ask the user for the number of rooms on the floor and how many of them are occupied. After all the iterations, the program should display how many rooms the hotel has, how many of them are occupied, how many of them are unoccupied. The percentage may be calculated by dividing the number of rooms occupied by the number of rooms.



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THANK YOU