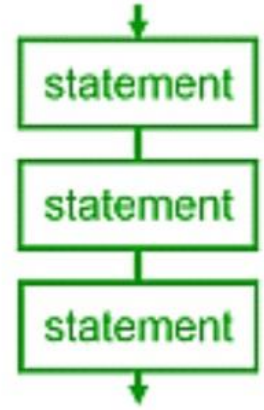
Programming Language

Learning Python Part II

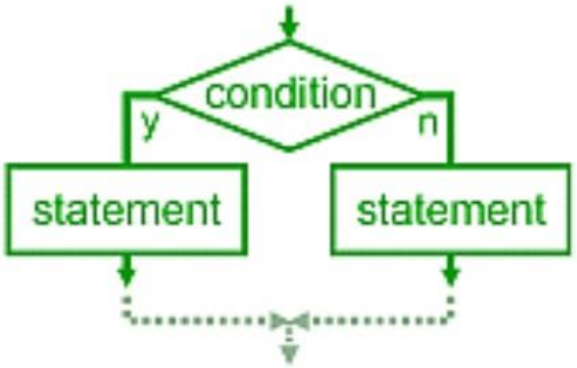
Structured Programming

Following the structured program theorem, all programs are seen as composed of control structures:

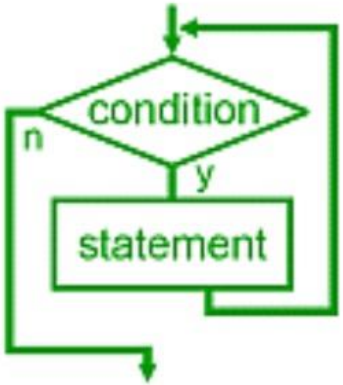
1. "Sequence“ - ordered statements or subroutines (functions/libraries) executed in sequence.
2. "Selection“ - one or a number of statements is executed depending on the state of the program.
3. "Iteration“ - a statement or block is executed until the program reaches a certain state, or operations have been applied to every element of a collection (block)



Sequence



Selection



Iteration

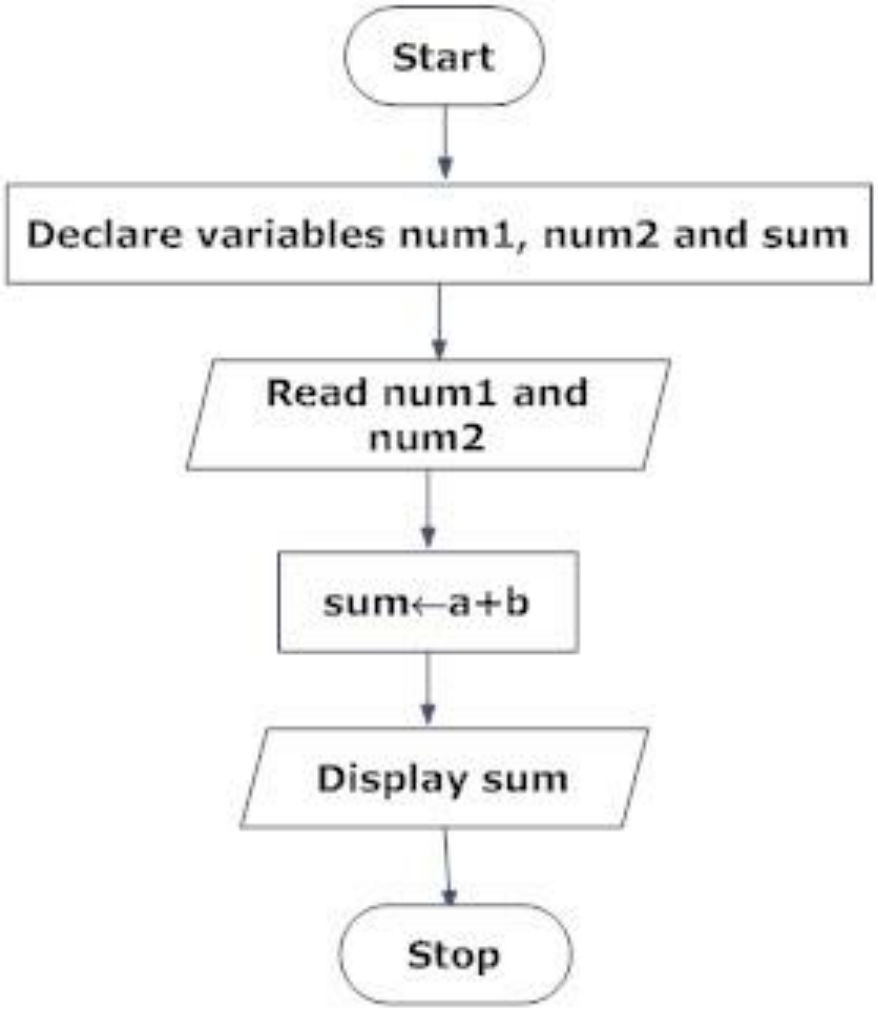
Flowchart in Programming

- A flowchart is a diagrammatic representation of an algorithm.
- A flowchart can be helpful for both writing programs and explaining the program to others.

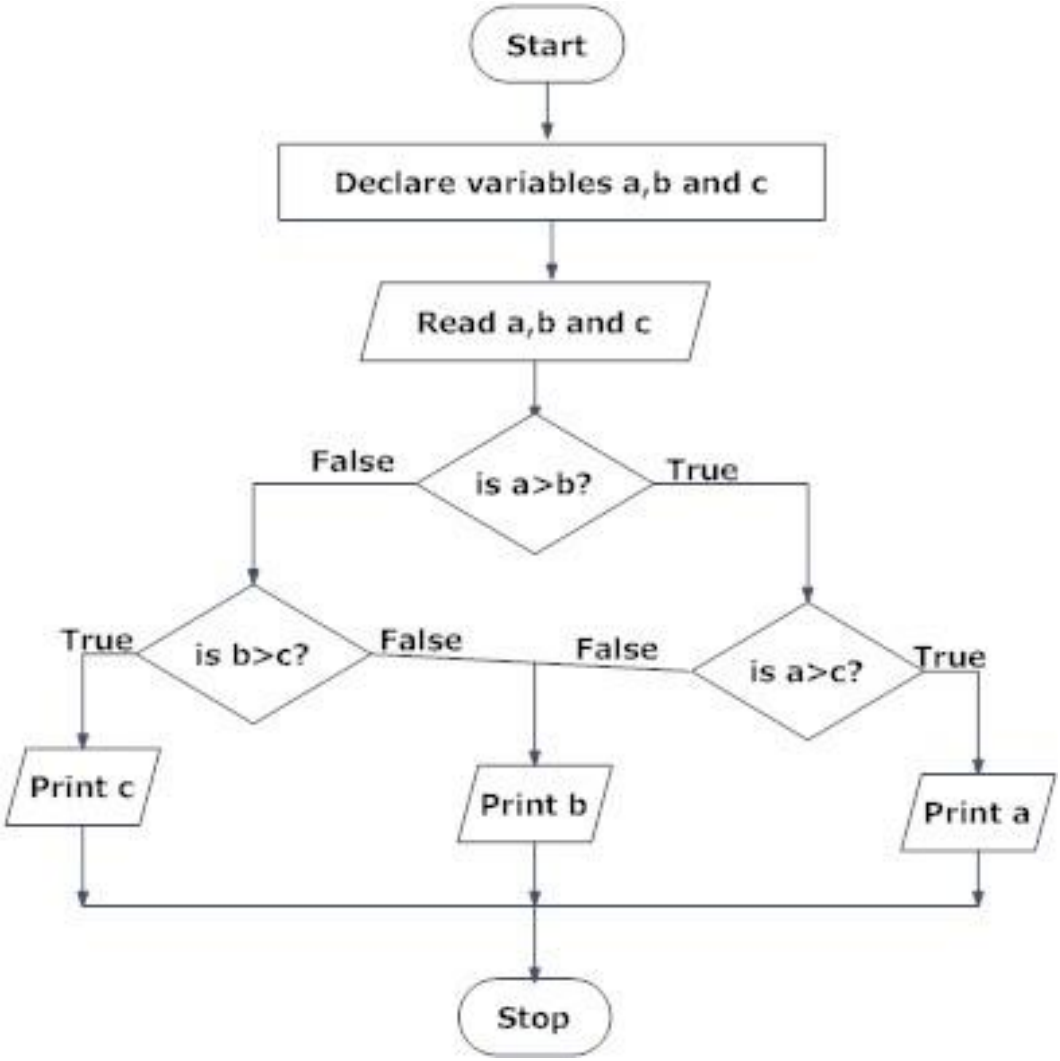
Symbols Used In Flowchart

Symbol	Purpose	Description
	Flow line	Indicates the flow of logic by connecting symbols.
	Terminal(Stop/Start)	Represents the start and the end of a flowchart.
	Input/Output	Used for input and output operation.
	Processing	Used for arithmetic operations and data-manipulations.
	Decision	Used for decision making between two or more alternatives.
	On-page Connector	Used to join different flowline
	Off-page Connector	Used to connect the flowchart portion on a different page.
	Predefined Process/Function	Represents a group of statements performing one processing task.

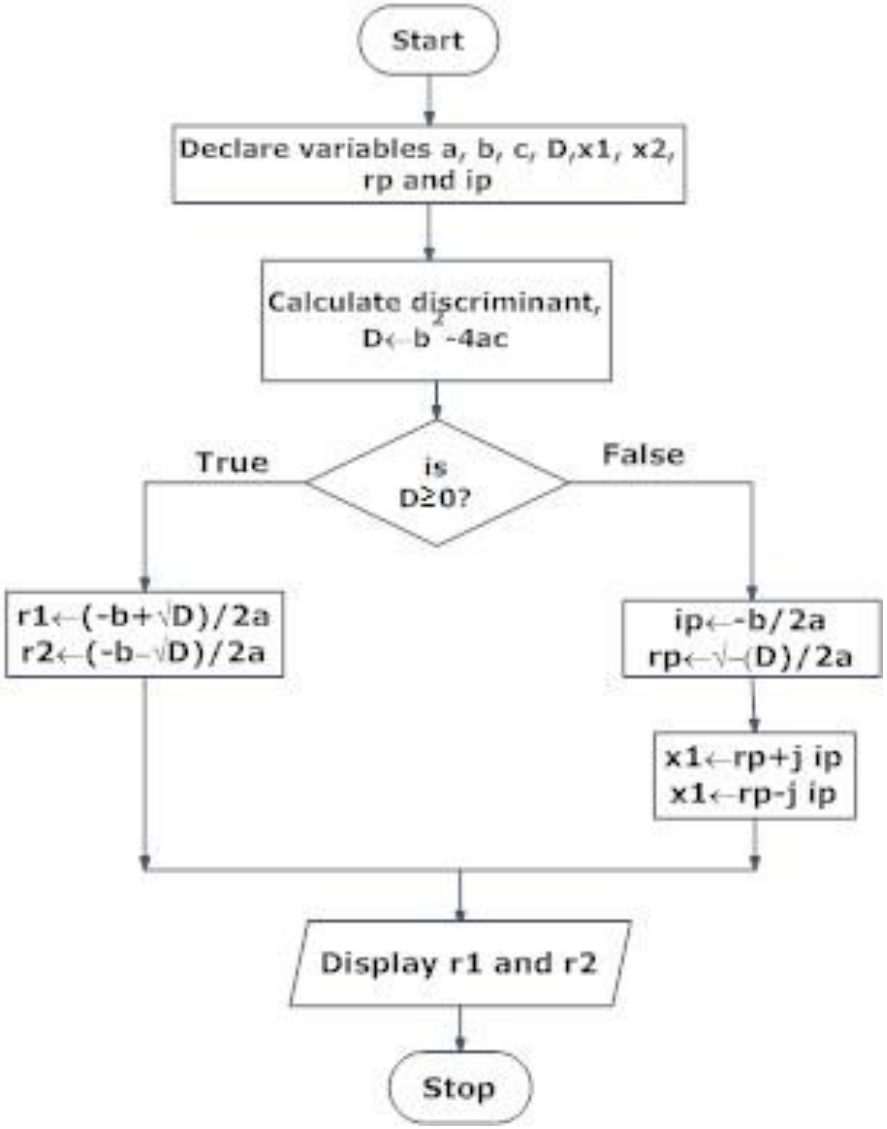
Example – add two numbers entered by user



Example – Find the largest among three different numbers entered by the user



Example – Find all the roots of a quadratic equation ax2+bx+c=0



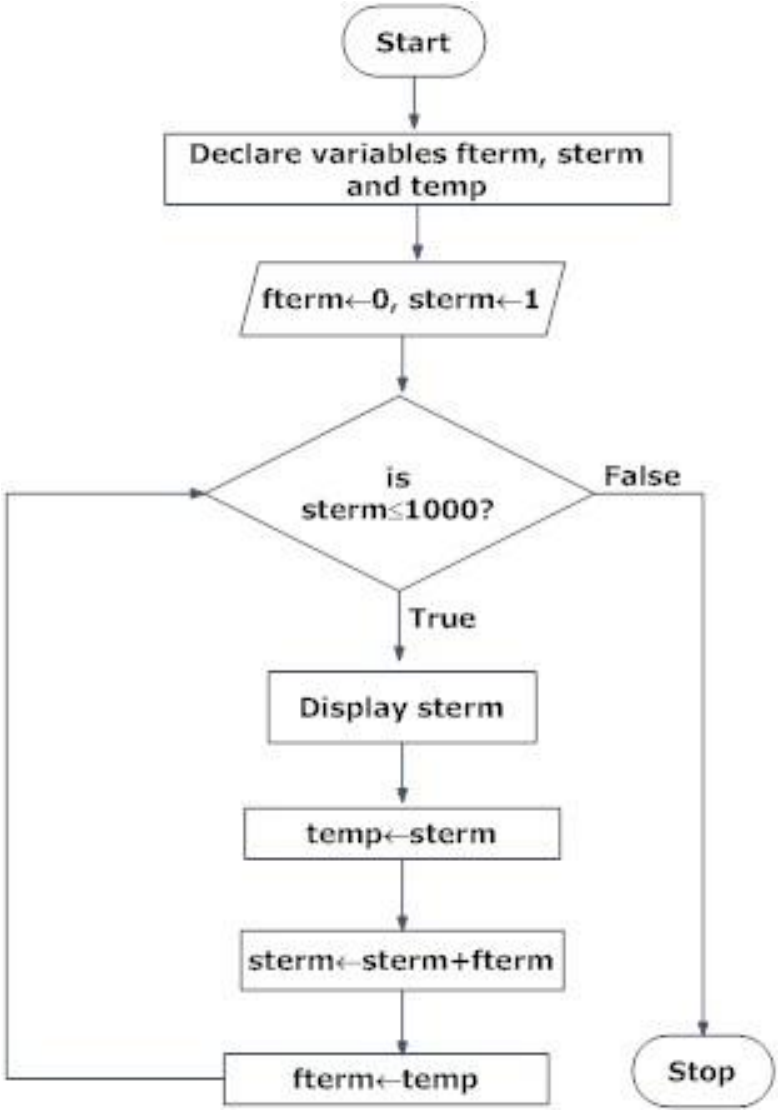
Example – Find the Fibonacci series till term≤1000.

Fibonacci sequence is a number sequence such that each number is the sum of the two preceding ones, starting from 0 and 1.

The beginning of the sequence is thus

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144…

Ref:
https://en.wikipedia.org/wiki/Fibonacci_number



Examples of Python “sequence” Commands

1. General (Platform independence)
   - num_a = **int**(input("enter first **number**: "))
     - ➢ Define variable types: int(), long(), float(), complex()
   - print("**sum**:", **sum**)
   - computation: a + b; a-b; a * b; a/b;
   - Function : import math;

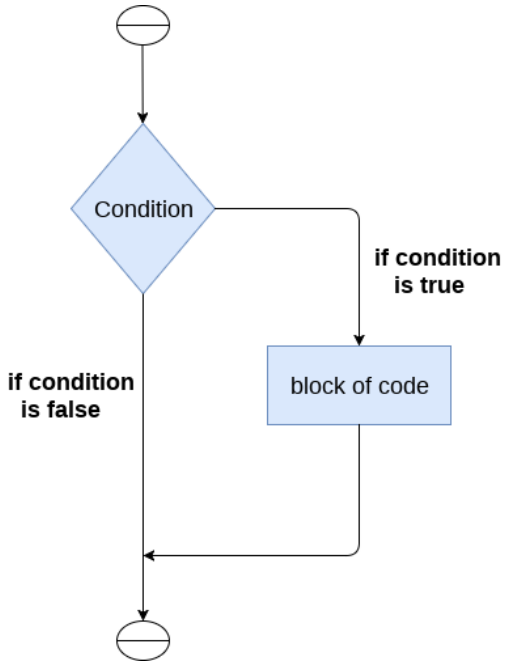
2. MicroBit (Platform dependence)
   - button_a.get_presses()
   - display.scroll("Hello, World!")
   - computation: a + b; a – b; a * b; a / b

Reference of python3 commands (general):
https://www.javatpoint.com/how-to-print-pattern-in-python
https://www.tutorialspoint.com/python3/python_variable_types.htm
Reference of python commands (specific for Microbit)
https://microbit-micropython.readthedocs.io/en/latest/tutorials/introduction.html

Examples of Python “selection” Commands

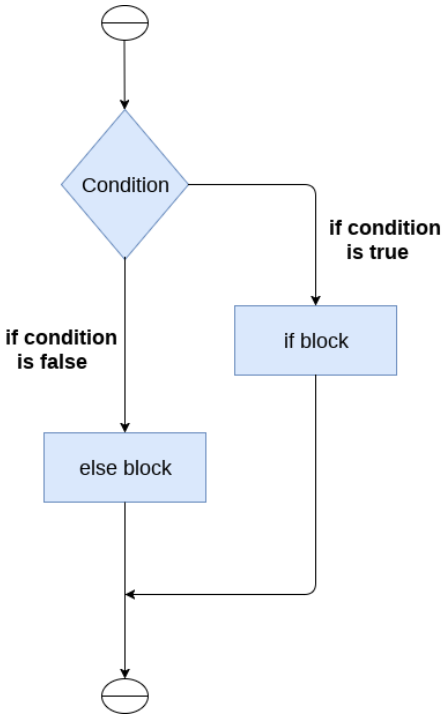
1. if..then

```
num = int(input("enter the number?"))
if num%2 == 0:
    print("Number is even")
```



2. if..then..else

```
age = int (input("Enter your age? "))
if age>=18:
    print("You are eligible to vote !!");
else:
    print("Sorry! you have to wait !!");
```



Examples of Python "iteration" Commands

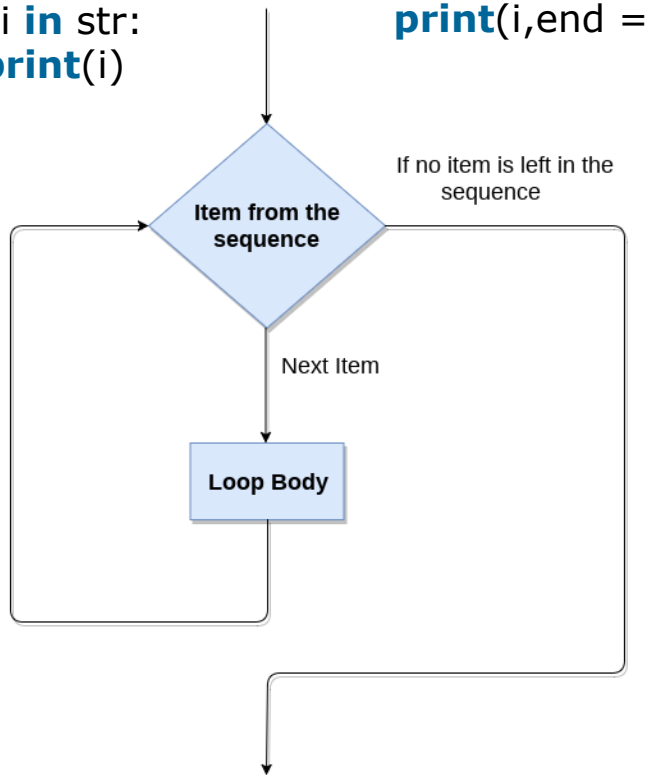
1. For loop

Example 1:

```
str = "Python"
for i in str:
    print(i)
```

Example 2:

```
for i in range(10):
    print(i,end = ' ')
```

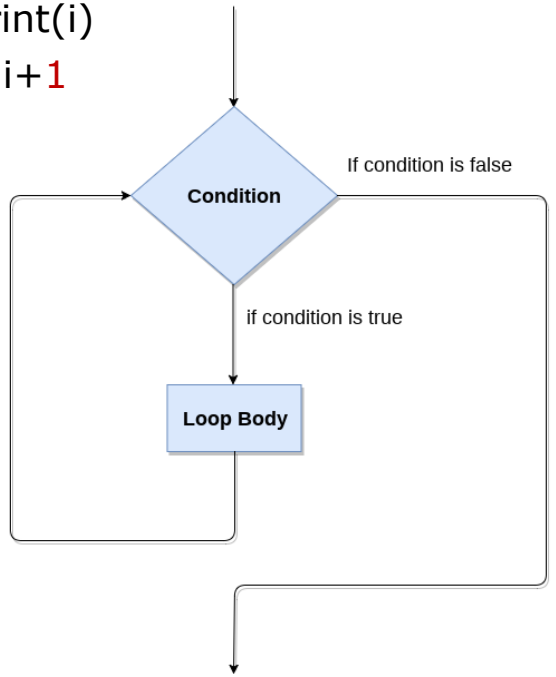


https://www.javatpoint.com/python-for-loop

2. While loop

Example:

```
i=1
#The while loop will iterate until conditi
on becomes false.
While(i<=10):
    print(i)
    i=i+1
```



https://www.javatpoint.com/python-while-loop

Demonstration