Introduction to programming with Python (Lecture 3)
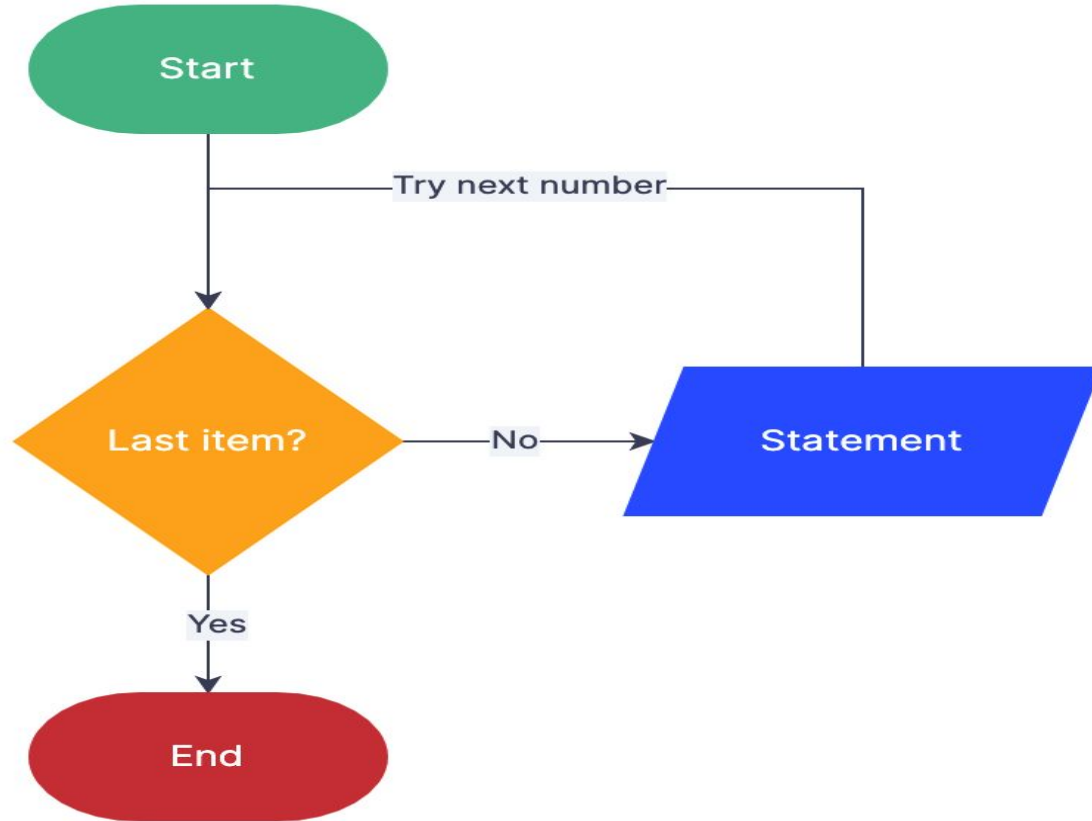
Imtiaz Ul Hassan

Loops

- Loops are essential in programming to execute a block of code repeatedly until a given condition
- Python offers two main types of loops: "for" and "while."

For Loop

The "for" loop is used for iterating over a sequence (that is either a list, tuple, dictionary, string, or range).

For Loop Flowchart

```
for variable in sequence:
    # Code to be executed during each iteration
```

While Loop
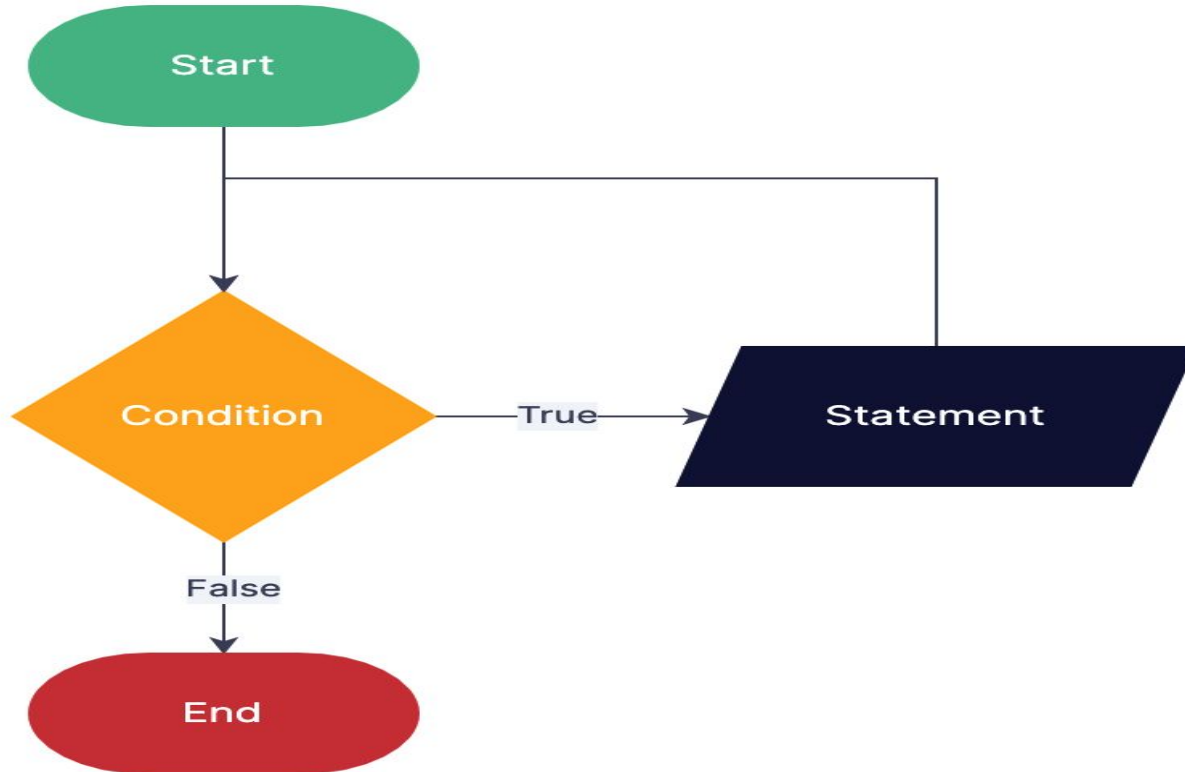
- The "while" loop continues to execute a block of code as long as a specified condition is true

While Loop

```
while condition:
    # Code to be executed as long as the condition is true
```

While Loop Flowchart

Loop Control Statements

- Python provides "break" and "continue" statements to control loop execution.
- "break" terminates the loop prematurely.
- "continue" skips the rest of the code inside the loop for the current iteration and moves to the next.

Example:

```python
for num in range(10):
    if num == 5:
        break
    print(num)
```

Nested Loops in Python

- Python allows nesting loops, where one loop is placed inside another.
- Useful for handling complex scenarios or iterating through multidimensional data structures.

Practice

1. Write a Python program to calculate the sum of all numbers from 1 to 10 using a "for" loop.
2. Create a Python program that prints the multiplication table of a given number (e.g., 5) using a "while" loop.
3. Write a program that takes a list of names and prints each name with a greeting message using a "for" loop.
4. Develop a Python program to find and display the factorial of a given number using a "while" loop.

Problems

- Create a program that prints the Fibonacci sequence up to the 10th term using a "for" loop.
- Write a Python program to check if a given number is prime using a "while" loop.
- Develop a program that iterates through a list of integers and prints only the even numbers using a "for" loop.
- Create a simple guessing game where the user has to guess a randomly generated number between 1 and 20. Provide hints if the guess is too high or too low, using a "while" loop.
- Write a Python program to count the number of vowels in a given string using a "for" loop.
- Develop a program that prints the first 10 square numbers (1, 4, 9, ...) using a "for" loop.