

# Loops

A **loop** is a programming construct that allows you to **execute a block of code repeatedly** as long as a certain condition is true.

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## 2. Types of Loops

### A. For Loop

- **Definition:** Executes a block of code a **specific number of times**. It is often used when the number of iterations is known.
- **Syntax (Python):**

for variable in sequence:

# code block

- **Example:**

# Print numbers from 1 to 5

for i in range(1, 6):

print(i)

**Output:**

1

2

3

4

5

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### B. While Loop

- **Definition:** Executes a block of code **as long as a condition is true**. Used when the number of iterations is not known in advance.
- **Syntax (Python):**

while condition:

# code block

- **Example:**

# Print numbers from 1 to 5

```
i = 1
while i <= 5:
    print(i)
    i += 1
```

**Output:**

```
1
2
3
4
5
```

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**C. Nested Loop**

- **Definition:** A loop inside another loop. Useful for working with multi-dimensional data structures (like matrices).
- **Syntax (Python):**

```
for outer_variable in sequence:
    for inner_variable in sequence:
        # code block
```

- **Example:**

```
# Print a 3x3 matrix of numbers
for i in range(1, 4):
    for j in range(1, 4):
        print(i, j)
```

**Output:**

```
1 1
1 2
1 3
2 1
2 2
```

2 3

3 1

3 2

3 3

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