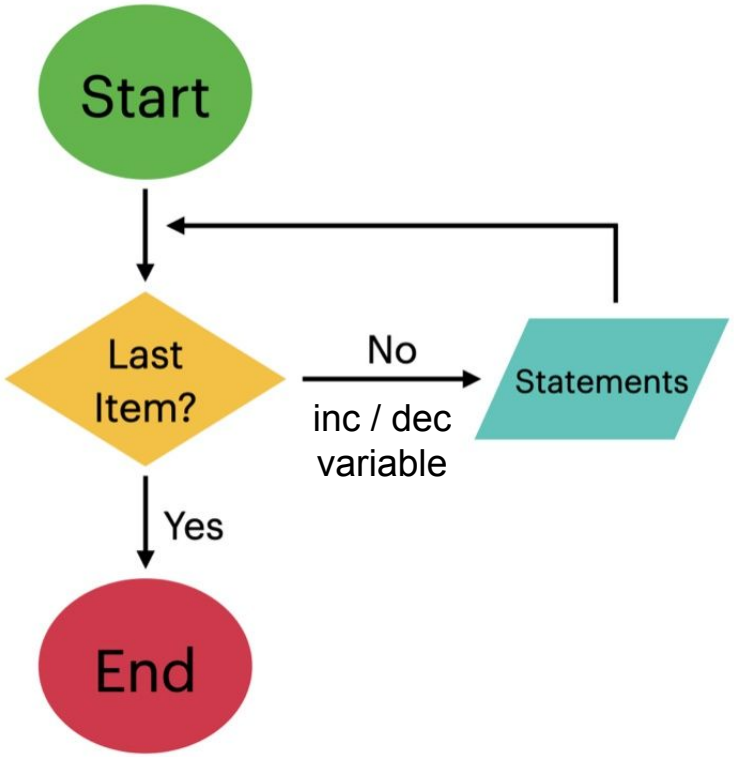
CENG 113 – Programming Basics

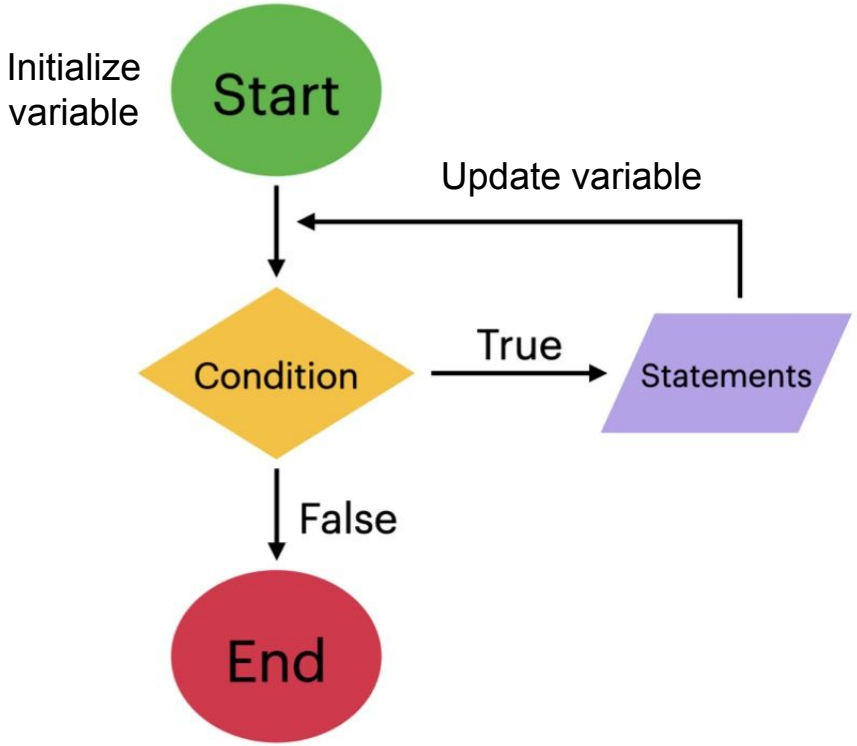
Lab 5

Repetition Structures

For Loop



While Loop



for vs while

- Iteration based
- Only increment / decrement
- Specific range → Safe
- Automatic iterator initialization

```
for i in range(1,10,2):
    print(i**2)
```

```
for ch in "hello":
    print(ch)
```

```
for color in ["blue", "red"]:
    print(color)
```

```
for n in range(10):
    if n % 3 == 0:
        continue
    else:
        print(n)
```

- Condition(s) based
- Any type of operations on iterator
- Infinite loops possible → Dangerous
- Manual iterator initialization

```
while True:
    if ... :    # Exit condition
        break
```

```
x = 2
while x <= 20:
    print(x)
    x = x**2
```

```
x = 20
y = 1
while x > 5 and y < 8:
    x /= 2
    y *= 3
    print(x+y)
```

Nested Loops (`for`) V1

```
M = [[1,2,3],
     [4,5,6],
     [7,8,9]]

sum = 0
for r in range(0, len(M)):
    for c in range(0, len(M[r])):
        sum += M[r][c]
print(sum)
```

Nested Loops (`for`) V2

```
M = [[1,2,3],
     [4,5,6],
     [7,8,9]]
```

```
sum = 0
for arr in M:
    for elem in arr:
        sum += elem
print(sum)
```

Nested Loops (`while`)

```
M = [[1,2,3],
     [4,5,6],
     [7,8,9]]
```

```
sum = 0
r = 0
while r < len(M):
    c = 0
    while c < len(M[r]):
        sum += M[r][c]
        c += 1
    r += 1

print(sum)
```

Exercises

Factorial

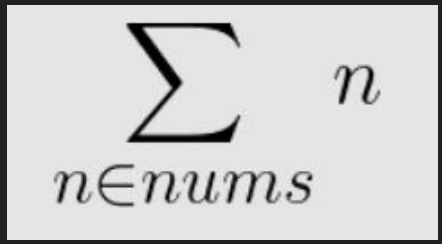
Write a Python program which calculates n factorial where **n** is **given by the user**.

```
n! = n * (n-1) * … * 1
```

Sum of a list

Write a Python program which calculates sum of the elements of a given list.

```
nums = [8, 60, 43, 55, 25, 134, 2]
```



Power

Write a Python program that asks the user for two integers **a** and **b** and calculates $\mathbf{a^b}$ without using ** operator and pow function.

Think both cases of b≥0 and b≤0.

Multiplication Table

Write a Python program that takes an integer from user and displays the multiplication table for it.

Example:

```
Enter an integer: 8
8 x 1 = 8
8 x 2 = 16
8 x 3 = 24
8 x 4 = 32
8 x 5 = 40
8 x 6 = 48
8 x 7 = 56
8 x 8 = 64
8 x 9 = 72
8 x 10 = 80
```

% of evens

Write a Python program that takes **N** integers from user and displays % of even ones.

Hint: Take **N** from user at the beginning and use it to create a loop.

Example:

```
How many numbers? 4
Enter an integer: 19
Enter an integer: 248
Enter an integer: 7
Enter an integer: 483
25.0 %
```

Matching Digits

Write a Python program that asks the user for two positive integers and finds the number of matching digits (starting from units digit).

Example 1:

```
Enter number 1:   1352
Enter number 2: 901052
3
```

Example 2:

```
Enter number 1: 12345
Enter number 2:   321
1
```

Password Checker

Write a Python program that asks the user for a password as soon as he/she enters the right password.

Display “Wrong” when password and input don’t match.
Display the first letter of the password when input is “help”.
Display “Welcome” and exit when input and password match.

Hint: Define a static password “abc123” at the beginning.

Example:

```
Enter password: xyz111
Wrong
Enter password: help
a
Enter password: abc123
Welcome
```

Fibonacci

Write a Python program that asks the user how many Fibonacci numbers to generate and then displays them.

Hints:

- The Fibonacci sequence is a sequence of numbers where **any number is the sum of the previous two numbers**.
- The sequence looks like this:
  1, 1, 2, 3, 5, 8, 13, 21, …

Max Revenue

Assume that matrix **M** given below consists of the sales history of a market in the last 5 days. **For example,** in Thursday two items are sold by $4 and $2. Write a Python program that finds and displays the name and revenue for the day with highest total revenue.

```
M = [[1,3,5,4,2],
     [3,2,4,2,1]]

days = ['Monday','Tuesday','Wednesday',
        'Thursday','Friday']
```

Sum of primes

Write a Python program which calculates sum of the prime numbers in a given matrix.

```
M = [[7, 60, 43], [55, 25, 2]]
```

Hint: There will be 3 nested loops. One of them is to check whether a number is prime or not.