

Python Practice Programs on If_for_while loop

1. Check Whether a Number is Positive, Negative, or Zero

Concept: if-elif-else

```
num = int(input("Enter a number: "))
```

```
if num > 0:
```

```
    print("Positive number")
```

```
elif num < 0:
```

```
    print("Negative number")
```

```
else:
```

```
    print("Zero")
```

2. Find the Largest of Three Numbers

Concept: if-elif-else

```
a = int(input("Enter first number: "))
```

```
b = int(input("Enter second number: "))
```

```
c = int(input("Enter third number: "))
```

```
if a >= b and a >= c:
```

```
    largest = a
```

```
elif b >= a and b >= c:
```

```
    largest = b
```

```
else:
```

```
    largest = c
```

```
print("Largest number =", largest)
```

3. Check Whether a Number is Even or Odd

Concept: if-else, modulus operator

```
num = int(input("Enter a number: "))
```

```
if num % 2 == 0:
    print("Even number")
else:
    print("Odd number")
```

4. Print Numbers from 1 to 10

Concept: for loop

```
for i in range(1, 11):
    print(i)
```

Output:

```
1
2
3
4
5
6
7
8
9
10
```

5. Find the Sum of First N Natural Numbers

Concept: for loop and accumulator

```
n = int(input("Enter n: "))
```

```
total = 0
```

```
for i in range(1, n + 1):
    total = total + i
```

```
print("Sum =", total)
```

Example:

Enter n: 5

Sum = 15

6. Print Multiplication Table

Concept: for loop

```
num = int(input("Enter a number: "))
```

```
for i in range(1, 11):
```

```
    print(num, "x", i, "=", num * i)
```

Example output:

5 x 1 = 5

5 x 2 = 10

5 x 3 = 15

...

5 x 10 = 50

7. Find the Factorial of a Number

Concept: for loop

```
n = int(input("Enter a number: "))
```

```
factorial = 1
```

```
for i in range(1, n + 1):
```

```
    factorial = factorial * i
```

```
print("Factorial =", factorial)
```

Example:

Enter a number: 5

Factorial = 120

8. Reverse a Number

Concept: while loop

```
num = int(input("Enter a number: "))
```

```
reverse = 0
```

```
while num > 0:
```

```
    digit = num % 10
```

```
    reverse = reverse * 10 + digit
```

```
    num = num // 10
```

```
print("Reversed number =", reverse)
```

Example:

Enter a number: 12345

Reversed number = 54321

9. Check Whether a Number is Prime

Concept: for loop, if, break

```
num = int(input("Enter a number: "))
```

```
if num < 2:
```

```
    print("Not a prime number")
```

```
else:
```

```
    is_prime = True
```

```
    for i in range(2, num):
```

```
        if num % i == 0:
```

```
            is_prime = False
```

```
            break
```

```
    if is_prime:
```

```
    print("Prime number")
else:
    print("Not a prime number")
```

Example:

Enter a number: 17

Prime number

10. Print Numbers Using break and continue

Concept: for, break, continue

for i in range(1, 11):

```
    if i == 5:
        continue
```

```
    if i == 9:
        break
```

```
    print(i)
```

Output:

1
2
3
4
6
7
8

Fibonacci Series

The Fibonacci series is a sequence where each number is the sum of the previous two numbers:

0, 1, 1, 2, 3, 5, 8, 13, 21, ...

```
n = int(input("Enter the number of terms: "))
```

```
a = 0
```

```
b = 1
```

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

```
    print(a, end=" ")
```

```
    c = a + b
```

```
    a = b
```

```
    b = c
```

Python Program: Palindrome Number

```
num = int(input("Enter a number: "))
```

```
original = num
```

```
reverse = 0
```

```
while num > 0:
```

```
    digit = num % 10
```

```
    reverse = reverse * 10 + digit
```

```
    num = num // 10
```

```
if original == reverse:
```

```
    print("Palindrome number")
```

```
else:
```

```
    print("Not a palindrome number")
```

Example 1

```
Enter a number: 121
```

```
Palindrome number
```

Python Program: Armstrong Number

```
num = int(input("Enter a number: "))
```

```
original = num
```

```
sum = 0
```

```
while num > 0:
```

```
    digit = num % 10
```

```
    sum = sum + digit ** 3
```

```
    num = num // 10
```

```
if original == sum:
```

```
    print("Armstrong number")
```

```
else:
```

```
    print("Not an Armstrong number")
```

Example 1

For 153:

$$1^3 + 5^3 + 3^3$$

$$= 1 + 125 + 27$$

$$= 153$$

1. Square Pattern

Output:

```
* * * *
```

```
* * * *
```

```
* * * *
```

```
* * * *
```

```
n = 4
```

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

```
    for j in range(n):
```

```
        print("*", end=" ")
```

```
print()
```

2. Right-Angled Triangle

Output:

```
*
* *
* * *
* * * *
* * * * *

n = 5
```

```
for i in range(1, n + 1):
    for j in range(i):
        print("*", end=" ")
    print()
```

Logic

When $i = 1 \rightarrow$ print 1 star
When $i = 2 \rightarrow$ print 2 stars
When $i = 3 \rightarrow$ print 3 stars

3. Inverted Right-Angled Triangle

Output:

```
* * * * *
* * * *
* * *
* *
*

n = 5
```

```
for i in range(n, 0, -1):
    for j in range(i):
```

```
    print("*", end=" ")
print()
```

4. Increasing Triangle Without Spaces

Output:

```
*
**
***
****
*****

n = 5
```

```
for i in range(1, n + 1):
    for j in range(i):
        print("*", end="")
    print()
```

5. Pyramid Pattern

Output:

```
  *
 ***
*****
*****
*****

n = 5
```

```
for i in range(1, n + 1):
    for j in range(n - i):
        print(" ", end="")

    for j in range(2 * i - 1):
```

```
print("*", end="")
```

```
print()
```

6. Inverted Pyramid

Output:

```
*****
```

```
*****
```

```
*****
```

```
***
```

```
*
```

```
n = 5
```

```
for i in range(n, 0, -1):
```

```
    for j in range(n - i):
```

```
        print(" ", end="")
```

```
    for j in range(2 * i - 1):
```

```
        print("*", end="")
```

```
print()
```

7. Diamond Pattern

Output:

```
*
```

```
***
```

```
*****
```

```
*****
```

```
*****
```

```
*****
```

```
*****
```

```

***

*

n = 5

# Upper half
for i in range(1, n + 1):
    for j in range(n - i):
        print(" ", end="")

    for j in range(2 * i - 1):
        print("*", end="")

    print()

# Lower half
for i in range(n - 1, 0, -1):
    for j in range(n - i):
        print(" ", end="")

    for j in range(2 * i - 1):
        print("*", end="")

    print()

```

8. Hollow Square

Output:

```

* * * * *
*       *
*       *
*       *
* * * * *

```

n = 5

```
for i in range(n):
    for j in range(n):
        if i == 0 or i == n - 1 or j == 0 or j == n - 1:
            print("*", end=" ")
        else:
            print(" ", end=" ")
    print()
```

9. Hollow Right-Angled Triangle

Output:

```
*
**
* *
* *
*****
n = 5
```

```
for i in range(1, n + 1):
    for j in range(1, i + 1):
        if j == 1 or j == i or i == n:
            print("*", end="")
        else:
            print(" ", end="")
    print()
```

10. Hourglass Pattern

Output:

```
*****
*****
```

```

*****
***
*
***
*****
*****
*****

```

n = 5

Upper part

```

for i in range(n, 0, -1):
    for j in range(n - i):
        print(" ", end="")

    for j in range(2 * i - 1):
        print("*", end="")

    print()

```

Lower part

```

for i in range(2, n + 1):
    for j in range(n - i):
        print(" ", end="")

    for j in range(2 * i - 1):
        print("*", end="")

    print()

```

Most important concepts to understand

Almost all * patterns use **nested loops**:

for i in range(...): # Rows

```
for j in range(...): # Columns
    print("*", end="")
print()             # Move to next row
```

Remember:

- $i \rightarrow$ controls **rows**
- $j \rightarrow$ controls **stars/columns**
- `end=""` $\rightarrow$ prints on the **same line**
- `print()` $\rightarrow$ moves to the **next line**
- `range(i)` $\rightarrow$ usually controls the **number of stars**
- `range(n-i)` $\rightarrow$ commonly controls **spaces**
- $2*i-1$ $\rightarrow$ commonly creates **pyramid width**

Find the Sum of First N Natural Numbers

Reverse a Number

Find the Factorial of a Number