

Nested while loop: A while loop inside another while loop

Syntax: initialization of outer while

```
while(condition): #outer while loop
    initialization of inner while
    while(condition): #inner while loop
        statements for inner while
        increment/decrement of inner while
    statements of outer while
    increment/decrement of outer while
```

Eg: Print right angle triangle

```
i=0                #or i=1
while(i<=4):       #i<=5
    j=0            #j=1
    while(j<i+1):  #j<=i
        print("*",end=" ")
        j+=1
    print()
    i+=1
```

1. Initial value of 'i' is 0
2. We will check for outer while condition i.e., $0 \leq 4$ (true)
3. Now initialize inner var i.e., $j=0$
4. Check for inner while condition i.e., $0 < 1$ (true)
5. Next enter inner while statement and print '*'
6. Increment the 'j' var by 1 i.e., $j=1+1=2$ [since $j=2$ and $2 < 1$ (false) it comes out and goes to next line and increments 'i' by 1

7. Now $i=2$ and the loop goes on till it satisfies the outer loop condition

O/p: *

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Nested while loop inside for loop: A while loop inside a for loop

Syntax: for var in range(): #outer loop

 Initialization of while loop

 while(condition): #inner loop

 statements of while loop

 inc/dec of while

 statements of for loop

Eg: To print a diamond shape pattern

for i in range(1,6,1):

 j=5

 while(j>i):

 print(" ", end=" ")

 j-=1

 k=1

 while(k<=i):

 print(i, end=" ")

 k+=1

 print()

for i in range(4,0,-1):

 j=5

 while(j>i):

```

        print(" ", end=" ")
    j-=1
k=1
while(k<=i):
    print(i,end=" ")
    k+=1
print()

```

- 1.Run the 'i' value from 1-5. Now i=1
- 2.Intialise the 'j'variable for inner while loop i.e.,j=5
- 3.Check the while condition i.e., 5>1(true)
- 4.Print the space and then decrement j by 1 i.e., j=5-1=4
- 5.Continue till the inner while loop condition satisfies i.e., till 1>1(false) and print spaces.
- 6.Then initialize k=1 to print 'i' value and check for condition i.e., 1<=1
- 7.Then accordingly print 'I' value and increment k by 1
- 8.Perform this till the condition satisfies.
- 9.The above steps are for printing above values, to print below values perform same operation but take the range of I from (4,0,-1).

O/P:

```

          1
        2  2
      3  3  3
    4  4  4  4
  5  5  5  5  5
    4  4  4  4
      3  3  3
        2  2
          1

```