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NESTED FOR

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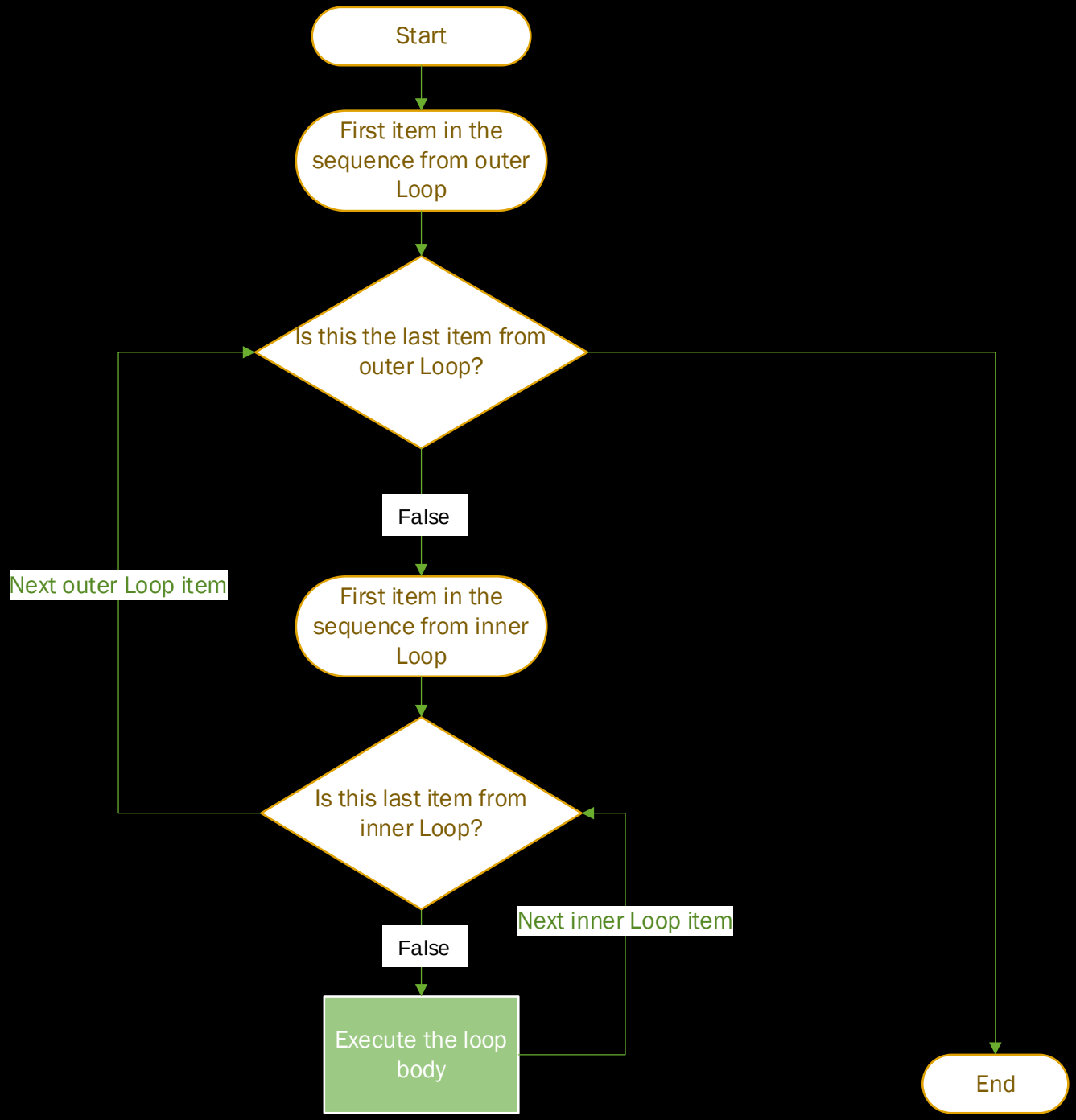
- Nested `for` loops are used when you need to iterate through elements in multiple dimensions or perform repetitive tasks with nested data structures, like 2D arrays or matrices.
- while loops are not usually nested inside each other.
- However, it is okay to have a for loop inside a while loop


Start
First item in the sequence from outer Loop
Is this the last item from outer Loop?
False
Next outer Loop item
First item in the sequence from inner Loop
Is this last item from inner Loop?
Next inner Loop item
False
Execute the loop body
End


Start
First item in the sequence from outer Loop
Is this the last item from outer Loop?
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Next inner Loop item
False
Execute the loop body
End

NESTING LOOPS IN LOOPS

for /while **……. :**

<<block>>

for /while **……. :**

<<block>>

…….

Example:

1. Print following multiplication table.

*1*1*
*2*1 2*2*
*3*1 3*2 3*3*
……
*9*1 9*2 9*3 …… 9*9*

EXAMPLE: LOOP IN LOOP

```
# Lecture 4, Example 7
# Nested loop - Multiplication table

print("Lecture 4, Example 7")
for i in range(1, 10):
    for j in range(1, i+1):
        print(str(i) + "*" + str(j) + "=" + str(i*j), end="\t")
    # Row change after each i change
    print()
```

```
Lecture 4, Example 7
1*1=1
2*1=2   2*2=4
3*1=3   3*2=6   3*3=9
4*1=4   4*2=8   4*3=12  4*4=16
5*1=5   5*2=10  5*3=15  5*4=20  5*5=25
6*1=6   6*2=12  6*3=18  6*4=24  6*5=30  6*6=36
7*1=7   7*2=14  7*3=21  7*4=28  7*5=35  7*6=42  7*7=49
8*1=8   8*2=16  8*3=24  8*4=32  8*5=40  8*6=48  8*7=56  8*8=64
9*1=9   9*2=18  9*3=27  9*4=36  9*5=45  9*6=54  9*7=63  9*8=72  9*9=81
```

NOTE ABOUT NESTED LOOPS

- Having loops inside loops makes computer programs slow
- Optimization of code is a more advanced topic, but bad programming can make an easy task VERY SLOW
- During this course, you shouldn’t have many loops inside loops.
- If you notice having a for loop inside a for loop inside a for loop, that is a bad code smell
  - Think your solution again. You should not need such complex code.