

Recursion



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Agenda

- **What is Recursion**
- **Recursion Tree**
- **Approach to recursive solution**

What is Recursion

- **Function calling itself is called recursion**
- **A recursive method solves a problem by calling a copy of itself to work on a smaller problem**
- **It is important to ensure that the recursion terminates**
- **Recursive code is generally shorter and easier to write than iterative code**

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Recursion Tree

```
def PrintN(n):  
    if n>0:  
        print(n, end=' ')  
        PrintN(n-1)
```

~~PrintN(3)~~

```
def PrintN(n):  
    if n>0:  
        print(n, end=' ')  
        PrintN(n-1)
```

```
def PrintN(n):  
    if n>0:  
        print(n, end=' ')  
        PrintN(n-1)
```

```
def PrintN(n):  
    if n>0:  
        print(n, end=' ')  
        PrintN(n-1)
```

```
def PrintN(n):  
    if n>0:  
        print(n, end=' ')  
        PrintN(n-1)
```

3 2 1

Approach to recursive solution

def SumN(n):
 if (n == 1):
 return 1
 return n + SumN(n-1)

① SumN(n) $\{1+2+3+\dots+n\}$
 ↓
 II SumN(n-1) $\{1+2+3+\dots+n-1\}$
 III
 if n == 1:
 return 1