# **🎬 Python Guide: Recursive Functions**

## **✅ What is a Recursive Function?**

A **recursive function** is a function that **calls itself** in order to **solve a smaller version of the same problem**.

🎯 You must always define a **base case** (stopping point) to prevent infinite looping.

## **🔁 Real-Life Analogy**

Imagine you're going up stairs:  
 Each time you take one step, you say:  
 **“One step done... ask the same question for the rest.”**

## **🔧 Simple Example: Factorial**

5! = 5 × 4 × 3 × 2 × 1 = 120

### **✅ Recursive Code:**

def factorial(n):

if n == 1:

return 1 # base case

return n \* factorial(n - 1) # recursive step

### **🔹 Usage:**

print(factorial(5)) # 120

### **🧠 Execution Flow:**

factorial(5)

→ 5 \* factorial(4)

→ 5 \* 4 \* factorial(3)

→ 5 \* 4 \* 3 \* factorial(2)

→ 5 \* 4 \* 3 \* 2 \* factorial(1)

→ 5 \* 4 \* 3 \* 2 \* 1 = 120

## **🔁 Another Simple Example: Countdown**

def countdown(n):

if n == 0:

print("🧨 Boom!")

return

print(n)

countdown(n - 1)

countdown(5)

# Output: 5 4 3 2 1 🧨 Boom!

## **❌ Common Mistake: No base case = Infinite recursion**

def oops(n):

return oops(n - 1) # ❌ No stopping point

Will raise:

RecursionError: maximum recursion depth exceeded

## **🔥 When to Use Recursive Functions**

| **Problem Type** | **Example** |
| --- | --- |
| Math problems | Factorial, Fibonacci |
| Tree/graph data | Navigating folder structure, trees |
| Divide & conquer | Binary search, merge sort |
| Nested structures | JSON traversal, HTML DOM |

## **📌 TL;DR (1-liner):**

A **recursive function** solves a problem by **calling itself** with a **smaller input**, and always includes a **base case** to stop.

## **🎯 Challenge for Your Audience (Reel Idea):**

# Print numbers from 1 to N using recursion

def print\_numbers(n):

if n == 0:

return

print\_numbers(n - 1)

print(n)

print\_numbers(5)

# Output: 1 2 3 4 5

### **About the Author**

**Gowtham SB** is a **Data Engineering expert, educator,** **and content creator** with a passion for **big data technologies, as well as cloud and Gen AI** . With years of experience in the field, he has worked extensively with **cloud platforms, distributed systems, and data pipelines**, helping professionals and aspiring engineers master the art of data engineering.

Beyond his technical expertise, Gowtham is a **renowned mentor and speaker**, sharing his insights through engaging content on **YouTube and LinkedIn**. He has built one of the **largest Tamil Data Engineering communities**, guiding thousands of learners to excel in their careers.

Through his deep industry knowledge and hands-on approach, Gowtham continues to **bridge the gap between learning and real-world implementation**, empowering individuals to build **scalable, high-performance data solutions**.

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