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🎬 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

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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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