COMP 110

More on Recursion… Reverse Engineering

Goal for today

- Start with a recursive python program and find out the standard function representation that it is describing.

Recap

Last class, we started with standard function definition and followed steps to define it as a recursive python program.

Steps:

- Standard function
- Sequence representation
- Recursive definition
- Recursive Python function

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$$f(n) = n$$

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Input n	0	1	2	3	…	n
Output f(n)	0	1	2	3	…	n

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- Base case:
  - for n = 0: f(n) = 0

- Recursive rule:
  - for n > 0, f(n) = f(n-1) + 1

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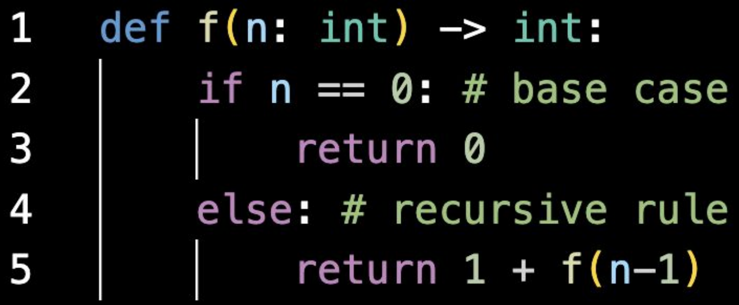

```python
def f(n: int) -> int:
    if n == 0: # base case
        return 0
    else: # recursive rule
        return 1 + f(n-1)
```

Today: Do it in Reverse

- Start with recursive Python function
- From that, get the recursive definition
- From that, get the sequence representation
- From that, get the standard definition

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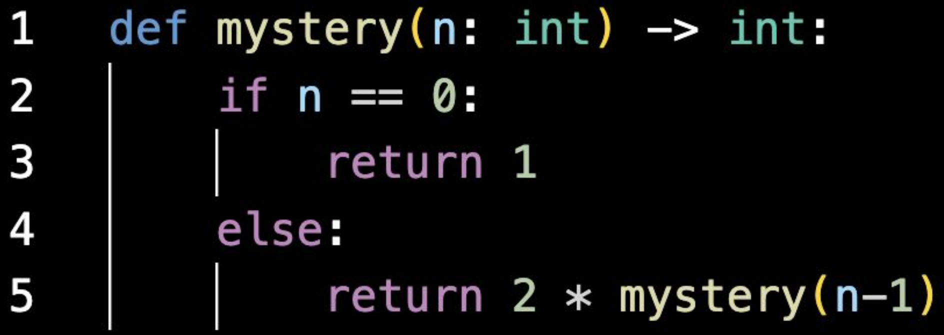

```
def mystery(n: int) -> int:
    if n == 0:
        return 1
    else:
        return 2 * mystery(n-1)
```