CHAPTER 12: RECURSION

12.1 WRITING RECURSIVE ALGORITHMS

12.1.1 Essential Components

1. **Base Case:** Condition that stops recursion
2. **Recursive Case:** Function calls itself with modified parameters

12.1.2 Examples

Sum of Numbers:

<PYTHON>

```
def sum(n):
 if n == 1:
 return 1
 else:
 return n + sum(n-1)
```

Counting Characters in String:

<PYTHON>

```
def count(char, string):
 if string == "":
 return 0
 elif string[0] == char:
 return 1 + count(char, string[1:])
 else:
 return count(char, string[1:])
```

Reverse String:

<PYTHON>

```
def reverse(string):
 if len(string) <= 1:
 return string
 else:
```

12.1.3 Tracing Recursion

<TEXT>

sum(4)

= 4 + sum(3)

= 4 + (3 + sum(2))

= 4 + (3 + (2 + sum(1)))

= 4 + (3 + (2 + 1))

= 4 + (3 + 3)

= 4 + 6

= 10

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