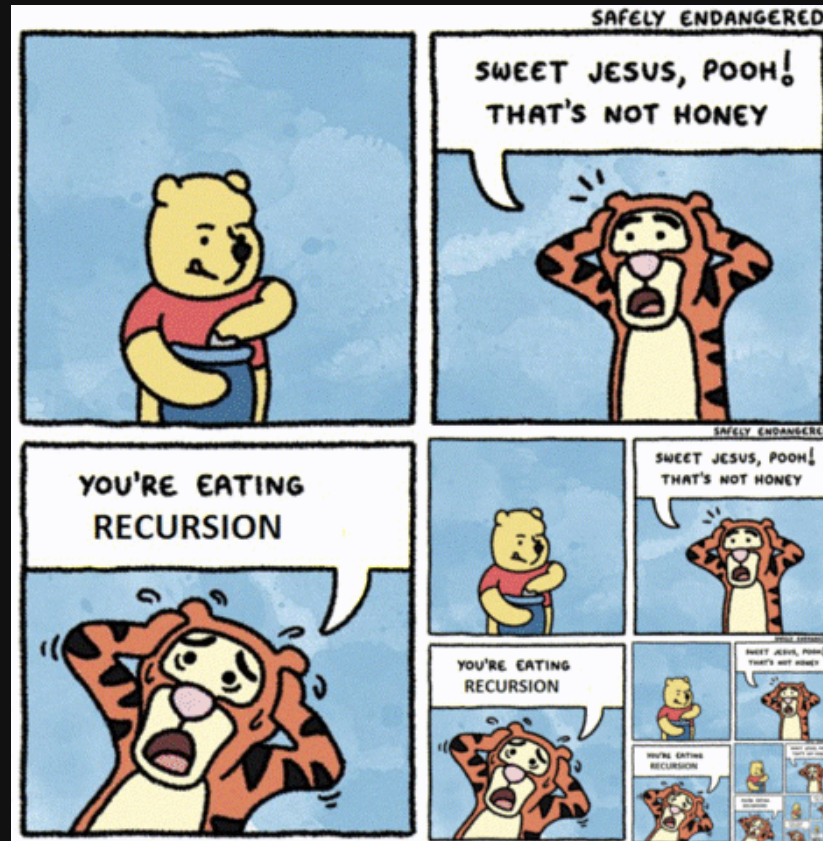# Recursion

Any questions before we start?

💡 Recursion Basics

Recursion

Recursion is the process of defining a problem (or the solution to a problem) in terms of (a simpler version of) itself.

Example

we can define the operation "Go to Home" as:

Base Case

1. If you are at home, stop moving.

Recursive Case

2. Take one step toward home.

3. "Go To Home".

Code

```
1
2  //A Simple Recursive Function
3  static void goHome(x,Home){
4
5    if(x == Home){
6        print("Reached Home")
7        return;
8    }
9
10   x = x + 1
11   goHome(x,Home)
12 }
13
14
15 //Main
16 int x = 1
17 int Home = 10
18 goHome(x,Home);
```

Recursion = Principal of Mathematical Induction

1. Figure of the Smallest Case

2. Always **Assume** the Subproblem Can be Solved

3. Solve the current problem assuming subproblem solution exists

💡 Factorial of Number

Input

5

Output

120

Call Stack! 👨‍💻

Time & Space Utilisation 👨‍💻

💡 Increasing Numbers

Given N, print numbers from 1 to N without using a Loop
(Use Recursion)

Input
5

Output
1, 2, 3, 4, 5

💡 Decreasing Numbers

Given N, print numbers from 1 to N without using a Loop
(Use Recursion)

Input

5

Output

5, 4, 3, 2, 1

💡 Sum the Digits

Given N, print the sum of digits of that number using recursion.

Input

512

Output

8