CSSE 220

Recursion

Checkout *Recursion* project from SVN

Recursion

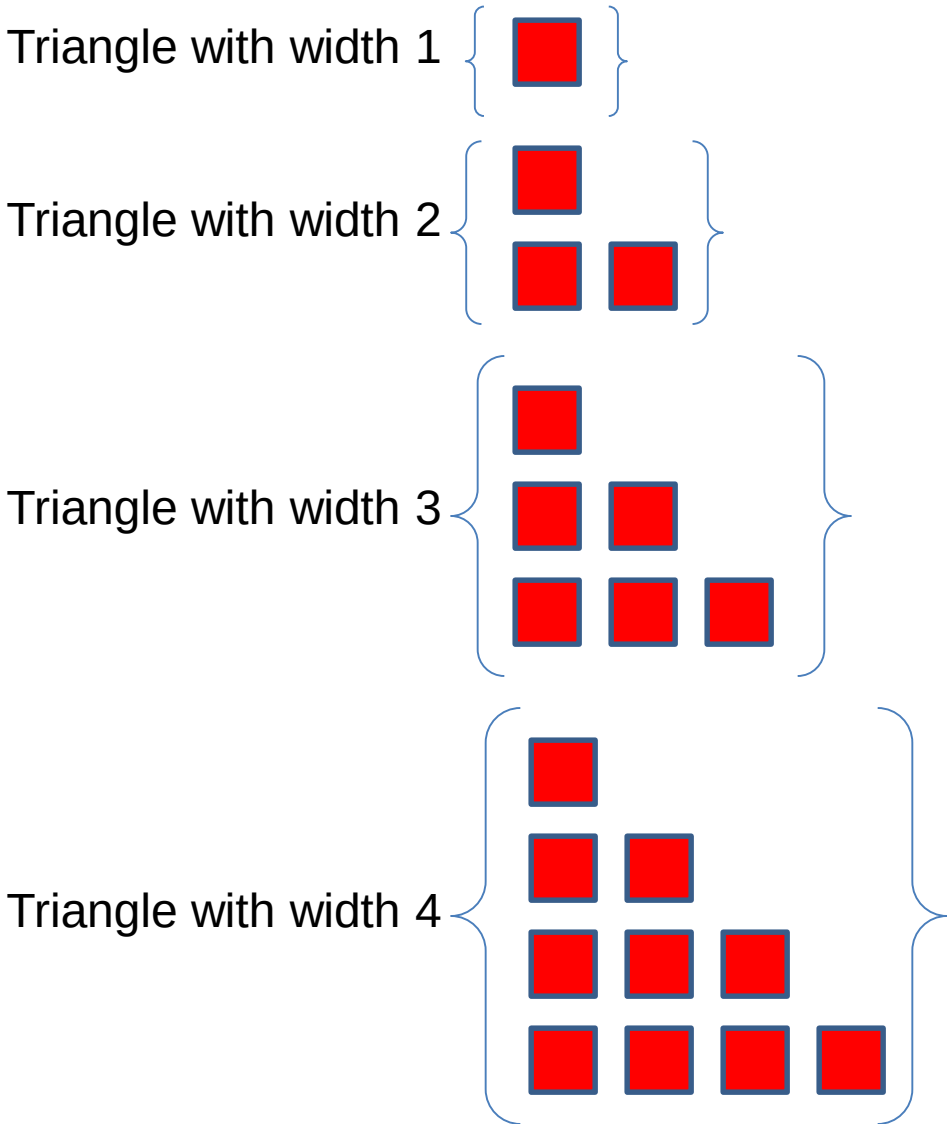
- A solution technique where the same computation **occurs repeatedly** as the problem is solved

- Examples:
  - Sierpinski Triangle: https://en.wikipedia.org/wiki/Sierpinski_triangle
  - Towers of Hanoi: http://www.mathsisfun.com/games/towerofhanoi.html or search for Towers of Hanoi

An example – Triangle Numbers

- If each red block has area 1, what is the ***area*** **A(n)** of the Triangle whose *width* is n?
  - Answer:

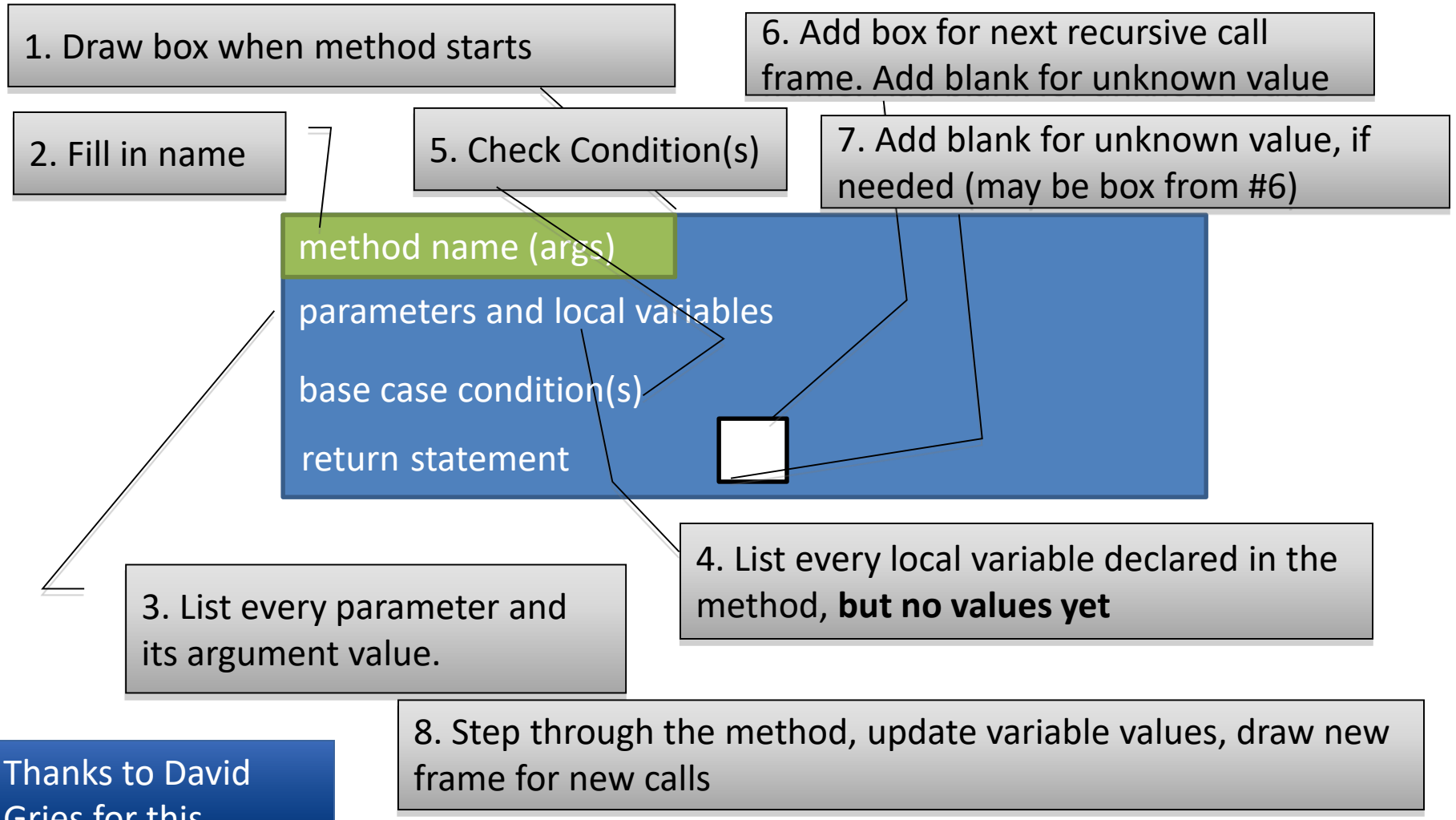
    A(n) = n + A(n-1)
- The above holds for which *n* ? What is the answer for other *n* ?
  - Answer: The recursive equation holds for n >= 1.
    For n = 0, the area is 0.



Key Rules to Using Recursion

- Always have a **base case** that **doesn't recurse**
- Make sure recursive case always **makes progress**, by **solving a smaller problem**
- **You gotta believe**
  - Trust in the recursive solution
  - Just consider one step at a time

Frames for Tracing Recursive Code

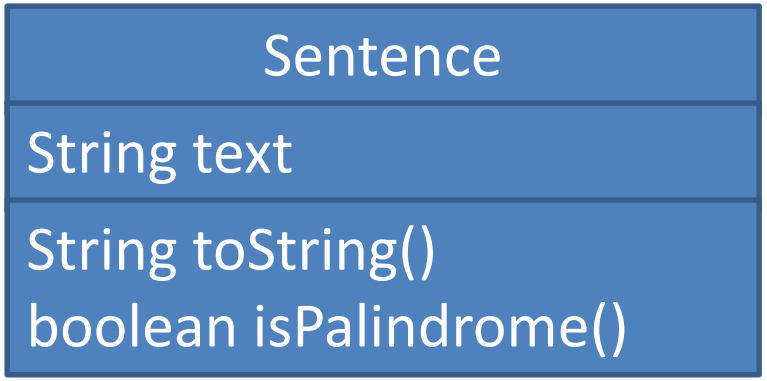


Thanks to David Gries for this technique

Q1-Q2

Programming Problem

- Add a recursive method to Sentence for computing whether Sentence is a palindrome



Practice Practice Practice

- Head to http://codingbat.com/java/Recursion-1 and solve 5 problems. I personally like bunnyEars, bunnyEars2, count7, fibonacci, and noX
- Get help from me if you get stuck
- Then take a look at the recursion homework