Assignment 2 - Factorials

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1 Psuedocode

Algorithm 1 Main

```
1: Scanner input = new Scanner
2: Integer max = INIT(input)
3: RECUSIONFUNC(max, MIN)
```

Algorithm 2 Initiate

Require: n

Ensure: $n \in \mathbb{N}$

```
1: function INIT(Scanner in)
2:     output Enter number of recusions
3:     while in.hasNext do
4:         if in.hasNextInt then
5:             return in.nextInt
6:         else
7:             output Enter Valid Number
8:             in.nextLine
9:     return in.nextInt
```

Algorithm 3 Recursion Function

```
1: function RECURSIONFUNC(Integer max, Integer min)
2:     if max ≥ min then
3:         for i = 0, 1, 2, ..., min − 1 do        ▷ Creates the indentations
4:             output " "
5:         output This was written by call number + min
6:         ▷ Works it's way through the recursion pathway ◁
           RECURSIONFUNC(max, min + 1)
7:         for i = 0, 1, 2, ..., min − 1 do        ▷ Creates the indentations
8:             output " "
9:         output This was ALSO written by call number + min
```

2 Output

```
PS C:\Users\rbrin\OneDrive\School\CS 3305\Assignments\A2\Recusion
>  c:; cd 'c:\Users\rbrin\OneDrive\School\CS 3305\Assignments\A2\
Recusion'; & 'C:\Program Files\Eclipse Adoptium\jdk-17.0.8.7-hots
pot\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp'
 'C:\Users\rbrin\AppData\Roaming\Code\User\workspaceStorage\76c6d
2c01922458f060e7e2bcc6e61cc\redhat.java\jdt_ws\Recusion_161c1e5e\
bin' 'Recursion'
Enter a number of times for recusion:
h
Please enter a valid number:
4
 This was written by call number 1
  This was written by call number 2
   This was written by call number 3
    This was written by call number 4
    This was ALSO written by call number 4
   This was ALSO written by call number 3
  This was ALSO written by call number 2
 This was ALSO written by call number 1
PS C:\Users\rbrin\OneDrive\School\CS 3305\Assignments\A2\Recusion
>
```

3 Code

```
// Name:          Ryan Brinson
// Class:         CS 3305 W04
// Term:          Spring 2023
// Instructor:    Carla McManus
// Assignment:    2 Part 2 Recursion

import java.util.InputMismatchException;
import java.util.Scanner;

public class Recursion {
    public static final int MIN = 1;
    public static void main(String[] args) {
        Integer max = 0;
        Scanner input = new Scanner(System.in);

        // Grab the user defined value
        max = init(input);

        // Recusion works it's way from a floor to a user entered max value
        recusionFunc(max, MIN);

        input.close();

    }

    public static int init(Scanner in){
        System.out.println("Enter a number of times for recusion: ");

        do {
            if (in.hasNextInt()) return in.nextInt();
            else {
                System.out.println("Please enter a valid number: ");
                in.nextLine();
            }
        } while (in.hasNext());

        return in.nextInt();
    }

    public static void recusionFunc(int max, int min){
        if (max >= min){
            // Set the indention size based on the recusion level
            for (int i = 0; i < min; i ++) System.out.print("  ");
            System.out.println("This was written by call number " + min);

            // Call the recursion increasing the lower bound by 1
            recusionFunc(max, min + 1);
```

```
            // After the recusion is called it works it's way back to the start
            for (int i = 0; i < min; i ++) System.out.print(" ");
            System.out.println("This was ALSO written by call number " + min);
        }
    }
}
```