CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Computing@CIT

ALGORITHMS AND DATA STRUCTURES

ASSIGNMENT 2: Algorithms and Data Structures.
PART I: Recursion

Exercise 1: Write a recursive function with this prototype:

```
public static int getMaxValue(myStack<Integer> s);
```

The function returns the maximum value of the Stack.

Exercise 2: Write a tail recursive function with this prototype:

```
public static int extra02(myStack<Integer> s, int max);
```

The function returns the maximum value of the Stack.

Exercise 3: Write a recursive function with this prototype:

```
public static int getNumAppearances(myList<String> l, String word);
```

The function returns the number of times the String word appears in the list l.

Exercise 4: Write a tail recursive function with this prototype:

```
public static int extra04(myList<String> l, String word,
                                                    int index, int accum);
```

The function returns the number of times the String word appears in the list l.

Exercise 5: Write a recursive function with this prototype:

```
public static int n_toThePowerof_m(int n, int m);
```

The function returns n^m.

Exercise 6: Write a tail recursive function with this prototype:

```
public static int extra06(int n, int m, int accum);
```

The function returns n^m.

Exercise 7: Write a recursive function with this prototype:

```
public static void convert(int num);
```

The function prints the value of num as a BINARY number in the screen. If num is zero, then a single zero is printed; otherwise no leading zeros are printed in the output. The '\n' character is NOT printed at the end of the output.

Examples:

```
  n=0  Output:0
  n=4  Output:100
  n=27 Output:11011
```

NOTE: Your recursive implementation must not use any local variables.

A tip for achieving this task is to repeatedly divide the decimal number by 2 and then take the remainder, the binary number will be the remainders read from bottom to top.

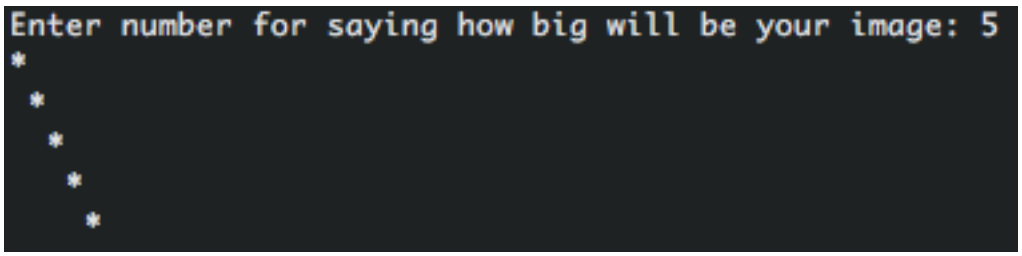
```
Ex:  Convert 22 to a binary representation

22 / 2 = 11 R 0
11 / 2 = 5  R 1
5  / 2 = 2  R 1
2  / 2 = 1  R 0
1  / 2 = 0  R 1

answer = 10110
```

Exercise 8: Write a recursive function with this prototype:

```
public static void draw_image(int num, int totalSize)
```

The function should print in the screen a diagonal of symbols * of size totalSize.

Example:



Submission instructions: Submit to Blackboard the file myMain.java containing the 8 filled methods.

Submission deadline: 10th April, 11:59pm.