**`You will create a program that will have at LEAST four different recursive methods.**

Your code should NOT contain any "do", "for" nor "while" loops *(no to any kinds of loops)*, all the looping SHOULD be done using recursion, this includes the menu displayed.

Your menu should display the following options:

1. power (int, int); //both int must be positive

2. decrease (int); //positive

3. summation (int); //positive

0. Exit

Warning: Your computer may crash (due to a possible stack overflow), so please test each method individually. Each one of the menu options should call a recursive method to perform the selected operation. The recursive menu should be displayed by a separate recursive method used to implement the menu and it should be called **menu**. This method should also filter out invalid entries.

|  |  |
| --- | --- |
| menu( ) | Recursive menu. The return values and parameters are up to you. This will be your choice. Must perform option validations and looping using recursion only. |
| power (int, int); //positive | The first number should be elevated to the power of the second number. Must perform validations as needed. |
| decrease (int); //positive | You should print the original number then, subtract one and print. Then, subtract one and print, and so on. Must continue printing until it reaches zero. Must perform validations as needed. Example if the number 4 is given you should print  4  3  2  1  0 |
| summation (int); //positive | Given one number ***N***the summation from 1 to ***N*** should be calculated. Must perform validations as needed.  Example, if the number 4 is given you should calculate (4+3+2+1) and print the addition: 10 |

Each one of the above recursive method is worth 50 points for a total of 200 points

* You must  verify that all the numbers that will be used in any of the previously described methods are positive integers, zero included where mathematics allow. The upper limit for anything is 12 (to prevent crashing)
* Watch out for negative numbers! You should not accept them
* You should try/catch for exception handling, as usual. Any uncaught exception will result in deduction.

**Prefer to work out a GUI?**

**Instead of**creating a recursive menu method within a command line program, you may create a GUI. If you choose to do this, instead of the main method and the menu method you will use the GUI.  The required methods listed **should be recursive**. Either way, your program MUST be user-friendly. The points will be the same regardless of what you choose.

* Program usability 25 points.
* Java coding standards 15 points.

**Your driver program name should be: AllRecursive.java** If you have any other files, they may be called anything you want as long as the file used to run your code is AllRecursive.java  
If you have any questions please email me: blanca@hawaii.edu