COMPUTER SCIENCE 10A (FALL TERM, 2021)
INTRODUCTION TO PROBLEM SOLVING IN PYTHON
PROGRAMMING ASSIGNMENT 3
DUE: WEDNESDAY, OCT 13TH, 11.59PM

Program Description:

This assignment will test your understanding of the use of **for loops .** Write four scripts to solve the following problems and name each script Problem1.py, Problem2.py, etc.

Problem 1:

Write a program that asks the user to enter an exponent. Then calculate and print 2 to the power of that exponent starting from 2^0 up to the user's number, inclusive. You may assume that the number entered by the user is 0 or greater than 0. For example:

```
Enter a number for exponent: 5
1
2
4
8
16
32
```

Problem 2:

The factorial function is used frequently in probability problems. The factorial of a positive integer n (written n! and pronounced "n factorial") is equal to the product of the positive integers from 1to n, e.g. 3! = 1 * 2 * 3 = 6. Write a program that asks for three integers and displays the factorial of each of them. Print the result in a tabular format as shown here:

```
Enter a number: 1
1! = 1
Enter a number: 3
3! = 6
Enter a number: 5
5! = 120
```

Problem 3:

Write a program that produces the following output:

```
***** ////////// *****
****  ////////\\  ****
***   //////\\\\   ***
**    ////\\\\\\    **
*     //\\\\\\\\     *
      \\\\\\\\\\
```

Problem 4:

Write a program that prompts for two integers representing the number of rows and columns, and prints a grid of integers from 1 to (rows * columns) in column major order. For example, if the user enters 4 and 6, your program should produce the following output:

```
1    5    9    13   17   21
2    6    10   14   18   22
3    7    11   15   19   23
4    8    12   16   20   24
```

Guidelines:

You should not have any code, except a call to your `main` function, outside of a function. You should use the `main` function to call other functions that implement the solution.

Include a header comment at the beginning of your program with some basic information and a description of the program in your own words.

```
# Name Student
# COSI 10a, Fall 2021
# Programming Assignment #3
#
# Description: ...
```

You also need to include comments in your code.

For this assignment, you must limit yourself to the Python features covered up to lecture 8.

Submission and Grading:

All your python scripts should be inside a folder named `yourfirstname_yourlastnamePA3`, then zip the folder into a zip file for submission. The zip file should have the following name: `yourfirstname_yourlastnamePA3.zip` (Please make sure to use exactly this file name, including identical capitalization).

Your program should be submitted via Latte the day it is due (for late policy check the syllabus).

You will be graded on:

- **External Correctness:** The output of your program should match exactly what is expected. Programs that do not compile will not receive points for external correctness.
- **Internal Correctness**: Your source code should follow the stylistic guidelines shown in class. Remember to include the comment header at the beginning of your program and comment your code.