Loops and Functions

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For each of the following problems, write a function that solves the problem. Demo each function you write by calling it.

1 99 Bottles of Beer

Write a function that uses a for loop to print out the the lyrics of the infamous "99 Bottles of Beer on the Wall" drinking song. However, this function should take in an `int` as a parameter and start the lyrics from there. For example, if the function is called with 10 as the parameter, the output should be:

```
10 bottles of beer on the wall, 10 bottles of beer
Take one down, pass it around, 9 bottles of beer on the wall

9 bottles of beer on the wall, 9 bottles of beer
Take one down, pass it around, 8 bottles of beer on the wall

... (output continues in the same pattern) ...

1 bottles of beer on the wall, 1 bottles of beer
Take one down, pass it around, 0 bottles of beer on the wall
```

2 Multiplication Table

Write a function which, given an integer n as an input, prints out an $n \times n$ multiplication table. A 3×3 multiplication table might look like

```
1 2 3
2 4 6
3 6 9
```

But there are many valid ways to present it.

3 Summation of squares

Write a function which, given an integer n, uses a for loop to print out the sum of all numbers squared from 1 to n. For example, if the given integer is 5, the program should print out 55, as $1^2 + 2^2 + 3^2 + 4^2 + 5^2 = 55$.

4 Hourglass

Write a function that creates the following figure of an hourglass. You must use nested for loops. This function takes no inputs.

```
|"""""""""""|
 \:::::::::/
  \:::::::/
   \:::::/
    \:::/
     \:/
      |
     /:\
    /:::\
   /:::::\
  /:::::::\
 /:::::::::\
|"""""""""""|
```

5 Slash Figure

Write a function, which given an `int` n, prints out a slash-based ASCII art of size n. Below is an example of what the output looks like at size 4:

```
!!!!!!!!!!!!!!
\\!!!!!!!!!!//
\\\\!!!!!!////
\\\\\\!!//////
```

And size 6

```
!!!!!!!!!!!!!!!!!!!!!!
\\!!!!!!!!!!!!!!!!!!//
\\\\!!!!!!!!!!!!!!////
\\\\\\!!!!!!!!!!//////
\\\\\\\\!!!!!!////////
\\\\\\\\\\!!//////////
```

And size 7:

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!
\\!!!!!!!!!!!!!!!!!!!!!!!!!!//
```

6 Grading

Each problem is worth 20 points, broken down as follows:

12 points The problem is solved as directed. Partial credit may be given for partial solutions at the grader's discretion.

3 points The code is properly indented and easy to read.

5 points The problem is in a function.