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CSCE 1030 Computer Science I – Section 002

Professor Helsing

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Algorithm for Homework 3

Calculations:

We can calculate all of the factorials beforehand:

If the user inputs 2: $1 * 2 = 2$.

If the user inputs 4: $1 * 2 * 3 * 4 = 24$.

If the user inputs 6: $1 * 2 * 3 * 4 * 5 * 6 = 720$.

If the user inputs 8: $1 * 2 * 3 * 4 * 5 * 6 * 7 * 8 = 40,320$.

If the user inputs 10: $1 * 2 * 3 * 4 * 5 * 6 * 7 * 8 * 9 * 10 = 3,628,800$.

If the user inputs 12: $1 * 2 * 3 * 4 * 5 * 6 * 7 * 8 * 9 * 10 * 11 * 12 = 479,001,600$.

This is how the output of the program looks:

```
*****
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*****
Please enter an EVEN integer in range 2 - 12: 6
6 is even.
The product of integers from 2 to 6 is 720.
      1
     2 2
    3 3 3
   4 4 4 4
  5 5 5 5 5
 6 6 6 6 6 6
```

Define 4 functions: your main function as well as functions to determine whether the user input is even, to calculate the product of numbers up to the user input, and to draw a triangle with the user input as the number of rows.

In the bool function to determine whether the input is even, include an if-else statement that returns true if the input is between 2 and 12 and if it is congruent to 0 (mod 2); else it returns false and gives an error message.

In the int function that calculates the product of all positive integers up to the user input, pass through the user input, create a for loop to multiply an initialized product by a counter \leq the user input. Output and return the product.

In the outer original for loop, make another for loop which accounts for the row counter. Notice that if the number is a single character (i.e. from 1-9), you need to include 2 spaces, else if it is ≥ 10 , you don't need any spaces.

Inside that for loop, create a nested for loop and initialize a variable called space which is initially $2 * (\text{user input} - \text{row}) - 1$, and have it decrement each time the for loop runs until it reaches 0. Have it cout a space.

In the void function that prints out the right angled, right justified triangle, pass through the original user input once more and create a for loop to manage the number of rows (which must be \leq the user input).

The only function which doesn't return a value is the void function (it doesn't need to return a value). However, we do need to make reference statements in the main function for all of the functions. Make sure to pass the user input as an integer in the main.

For the bool function, make sure to have it pass through another bool variable in the main function, and set it equal to false, and while false, be sure to cout the user input statement, and cin that value to the user input.

For the product calculate, create another integer variable, and set it equal to the function (user input);

And finally, for the void function, just make sure to include that in the main as well and pass through the user input.