Practical IB Computer Science Test #1—Factorial

Name: _____ Date: Monday, 11 November 2024

This program will print out the factorial of a positive integer. For example, the factorial of 8 is

$$8! = 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 40320$$

Work through the test from the beginning. Your program should build and grow –do not start a new program for each point. During this test, you may use any resources that you have created or provided to you by the teacher, but do **not** use Internet.

Instructions	***Program Display***
1. *Output* your name on the screen.	**(Your name)**
2. *Input* a number.	`Enter an integer between 1 and 12: 5`
3. Output a warning message *if the number is less than 0* and *exit the program*	`Enter an integer between 1 and 12: -3` ***Error-number out of range.***
4. Output an error message if the number is less than 0 *or greater than 12* and exit the program	`Enter an integer between 1 and 12: 13` ***Error-number out of range.***
5. *Calculate the factorial of the input number* and output the number and the result on the screen as shown	`Enter an integer between 1 and 12: 5` ***5! = 120***
6. Calculate the factorial of the input number and output the number, *all the factors* and the result.	`Enter an integer between 1 and 12: 5` ***5! = 5 x 4 x 3 x 2 x 1 = 120***
7. If the input number is greater than 10, output ***only*** the result and ***not*** the factors	`Enter an integer between 1 and 12: 12` ***12! = 479001600***
8. Modify your program to expand the valid range from 1 ~ 12 to 1 ~ 20	`Enter an integer between 1 and 20: 20` **20! = 2432902008176640000**

9. If the number is less than 1 or larger than 20, the program *asks for another number* (the program runs again instead of exiting)	`Enter an integer between 1 and 20: 0`
	Error-number out of range.
	`Enter an integer between 1 and 20: 7`
	7! = 7 x 6 x 5 x 4 x 3 x 2 x 1 = 5040

10. Calculate and output the number of digits of the factorial (result)	`Enter an integer between 1 and 20: 7`
	7! = 7 x 6 x 5 x 4 x 3 x 2 x 1 = 5040 digits: 4
	`Enter an integer between 1 and 20: 12`
	12! = 479001600 digits: 9

Submit your Java source code file to the corresponding online homework entry when you are done / before the end of the period. Good luck!

`12! = 479,001,600` `20! = 2,432,902,008,176,640,000`

Notes: Additional challenge: make sure that the output for 0! works correctly. Question number 9 is a *modification* to the answer of question number 4. In other words, if you succeed at #9, you get marks for #9 and #4.