

## Practical IB Computer Science Test #1—Factorial

Name: \_\_\_\_\_

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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.

<b>Instructions</b>	<b>Program Display</b>
1. <i>Output</i> your name on the screen.	(Your name)
2. <i>Input</i> a number.	Enter an integer between 1 and 12: 5
3. Output an warning message <i>if the number is less than 0 and exit the program</i>	Enter an integer between 1 and 12: -3 <b>Error-number out of range.</b>
4. Output an error message if the number is less than 0 <i>or greater than 12</i> and exit the program	Enter an integer between 1 and 12: 13 <b>Error-number out of range.</b>
5. <i>Calculate the factorial of the input number</i> and output the number and the result on the screen as shown	Enter an integer between 1 and 12: 5 <b>5! = 120</b>
6. Calculate the factorial of the input number and output the number, <i>all the factors</i> and the result.	Enter an integer between 1 and 12: 5 <b>5! = 5 x 4 x 3 x 2 x 1 = 120</b>
7. If the input number is greater than 10, output <b>only</b> the result and <b>not</b> the factors	Enter an integer between 1 and 12: 12 <b>12! = 479001600</b>
8. Modify your program to expand the valid range from 1 ~ 12 to 1 ~ 20	Enter an integer between 1 and 20: 20 <b>20! = 2432902008176640000</b>
9. If the number is less than 0 or larger than 20, the program <i>asks for another number</i> (the program runs again)	Enter an integer between 1 and 12: 7 <b>7! = 7 x 6 x 5 x 4 x 3 x 2 x 1 = 5040</b> Enter an integer between 1 and 12: 0 <b>Error-number out of range.</b>
10. Calculate and output the number of digits of the factorial (result)	Enter an integer between 1 and 20: 7 <b>7! = 7 x 6 x 5 x 4 x 3 x 2 x 1 = 5040 digits: 4</b> Enter an integer between 1 and 20: 12 <b>12! = 479001600 digits: 9</b>

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:** You may want to use `System.exit(1);`  
 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.