

Practice 2

Note

Only this class is a trial of a new educational system, so submission of "Practice2.java" will not be evaluated. Submissions will be evaluated from the next class, so please submit the program according to the instructions in Chapter 2 and confirm the submission method.

1. Factorial Function

The factorial of a positive integer n , denoted $n!$, is defined as the product of the integers from 1 to n . If $n = 0$, then $n!$ is defined as 1 by convention. The recursive definition of factorial function can be formalized as

$$n! = \begin{cases} 1 & \text{if } n = 0 \\ n \cdot (n-1)! & \text{if } n \geq 1 \end{cases}$$

Python implementation of a factorial function using recursion is shown in Fig. 1.

```
def factorial(n):  
    if n == 0:  
        return 1  
    else:  
        return n * factorial(n - 1)
```

Fig. 1 A recursive implementation of the factorial function.

2. Practice

Create a Java program (Practice2.java) to implement the recursive definition for the factorial function shown in Fig. 2. As shown in Fig. 3, "Practice2.java" obtains the factorial value of integers from 0 to 10.

```

/*****
 * Date
 * Contents of Program
 * Program creator
 */
public class Practice2 {

    public static void main(String[] args) {
        new Practice2();
    }

    public Practice2() {
        for(int i = 0; i < 11; i++) {
            System.out.println(i + "! = " + factorial(i));
        }
    }

    public int factorial(int n) {

        /* Complete this part */

    }
}

```

Fig. 2 The outline of "Practice2.java".

```

0! = 1
1! = 1
2! = 2
3! = 6
4! = 24
5! = 120
6! = 720
7! = 5040
8! = 40320
9! = 362880
10! = 3628800

```

Fig. 3 The factorial value of integers from 0 to 10.

Submit the program "Practice2.java" to Title "Practice 2" in Assignments page of "Programming Practice 2" course, manaba+R until 18:00 on May 14th, 2020.

The program should include the following information in the first part.

- ✓ Contents of the program
- ✓ Submission date
- ✓ Program creator