Tutorial for Control Statement 2

> Based on the tutorial of "2020S-Java-A" and "2020F-Java-A" designed by teaching group in SUSTech
>
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Objectives

1. Learn how to use the `while` and `for` repetition statement to execute statements in a program repeatedly.
2. Learn how to use the `switch` selection statements to choose among alternative actions.
3. Learn how to use the `break` and `continue` statements in a program.

Before Exercises

What is the output of the following code? Please read it carefully and make sure that you understand how it works.

```
public static void main(String[] args) {
    for (int i = 1; i <= 9; i++) {
        for (int j = 1; j <= i; j++) {
            System.out.printf("%d * %d = %d  ", j, i, j * i);
        }
        System.out.println();
    }
}
```

Exercises

Q1. Please write a program that displays a multiplication table of any given size in [1, 9]. The program should keep running until the user inputs 0. Also, the program should warn users about invalid inputs.

Try use `break` and `continue` to complete the task.

```
Please input a number to print the Multiplication Table [0 to terminate]:
2
1 * 1 =  1
1 * 2 =  2  2 * 2 =  4
Please input a number to print the Multiplication Table [0 to terminate]:
-4
Please input a number between [1,9]
Please input a number to print the Multiplication Table [0 to terminate]:
5
1 * 1 =  1
1 * 2 =  2  2 * 2 =  4
1 * 3 =  3  2 * 3 =  6  3 * 3 =  9
```

```
1 * 4 =  4  2 * 4 =  8  3 * 4 = 12  4 * 4 = 16
1 * 5 =  5  2 * 5 = 10  3 * 5 = 15  4 * 5 = 20  5 * 5 = 25
Please input a number to print the Multiplication Table [0 to terminate]:
0

Process finished with exit code 0
```

Q2. Calculate the value of π using the following formula

$\pi = 4 - \frac{4}{3} + \frac{4}{5} - \frac{4}{7} + \frac{4}{9} - \frac{4}{11} + \ldots$

Please use `while` or `for` loops to compute π. Users might input how many terms are used or how precise should the program reaches, which will be the termination condition for the loop.

```
Please input n:
10000
The estimatioin of Pi is 3.141499
```

```
Please input the precision:
0.0000001
The estimatioin of Pi is 3.141597
It computed 16777217 times
```

Q3. Please write a program that calculates simple expressions, such as $2 + 3.0$, for `+`, `-`, `*`, `/` operators. Users should input the first number, the operator, and the second number on consecutive lines and get the result. The program should handle invalid operators.

```
Enter expressions such as  2.0 + 2. Type -1 to quit.
2.0
-
1
Result: 1.0
3
+
4.6
Result: 7.6
5.5
&
1
Unknown operator: &
5.5
/
5
Result: 1.1
-1
```

```
Process finished with exit code 0
```

You should use `switch` to handle valid and invalid cases of input operators.