

## Basis of Computer Programming (Java A)

### Lab Exercise 6

#### [Experimental Objective]

- Learn how to use static method
- Learn how to use static method from other class
- Learn how to use method overloading
- Learn how to use two dimensional arrays
- Learn to develop and invoke methods with array arguments and return values.

#### [Exercises]

1. Create a class named *MyTriangle* that contains two static methods
  - a) **public static double area(double a, double b, double c)**
  - b) **public static double perimeter(double a, double b, double c)**
 to compute area and perimeter of a triangle respectively given three *valid* sides *a*, *b* and *c*.

And add a static method

```
/** Return true if the sum of any two sides is greater than the third side.
**/
```

- c) **public static boolean isValid(double a, double b, double c)**

In the main method of *MyTriangle*, test the three methods you write.

- 1) Get *a*, *b* and *c* from the Console
- 2) If *a* is -1, exit your program and print "Bye~"
- 3) If *a* is not -1, use *isValid* to check the input
- 4) If the input is valid, compute the area and perimeter and print them
- 5) If the input is not valid, return false and print "The input is invalid."
- 6) Go to 1)

*Tips: To call a method in the same class, you can try `method_name()`.*

Sample:

```
Please input three numbers for a, b, c:
1 1 2
The input is invalid.
Please input three numbers for a, b, c:
2 3 4
The area is 2.905
The perimeter is 9.000
Please input three numbers for a, b, c:
3.2 4.3 3.4
The area is 5.377
The perimeter is 10.900
Please input three numbers for a, b, c:
-1
Bye~
```

2. In the *MyTriangle* class created in Exercise 1, add two another static overloaded methods

**a) public static double area(double bottom, double height)**

**b) public static double area(double a, double b, int angleOfAandB)**

to compute the area.

The **a)** method is to compute area by *bottom* and *height*:

$$\text{area} = 1/2 * \text{bottom} * \text{height}$$

And the **b)** method is to compute area by two sides *a*, *b* and the angle between the two sides(*angleOfAandB*)

$$\text{area} = 1/2 * a * b * \sin(\text{angleOfAandB})$$

Then create another class *Lab6E2* that contains the main method.

In the main method:

- 1) Read *bottom* and *height* from the Console to compute area by calling the corresponding method you created in *MyTriangle*;
- 2) Read two sides *a*, *b* and *angleOfAandB* from the Console to compute area by calling the corresponding method you created in *MyTriangle*.

*Tips: To call a static method in another class class\_name under the same file directory, you can try class\_name.method\_name().*

Sample:

```
Please input two numbers for bottom and height:
4 5.6
The area is 11.200
Please input two numbers for a and b:
3 5.6
Please input a number in (0, 180) for angle (angle is an int variable):
55
The area is 6.881
```

3. Enter an integer *n*, please output the *n*th term of Fibonacci sequence. (starting from 0, the 0th term is 0)

$$* \text{Fibonacci sequence: } f(n) = f(n-1) + f(n-2)$$

Sample:

```
30
832040
```

4. Given a chessboard, 1 represents a black grid and 0 represents a white grid. If a grid is white and the top, bottom, left, and right grids of it are black, we call this grid a "bingo" grid. Please write a method:

**public static boolean check(int[][] board, int row, int column)**

*\*board is the chessboard, board[row][column] is the target grid*

to determine whether a grid is a bingo grid. Use this method to calculate how many bingo grids are on the board and output the result.

0	1	0	1	1	1	1
1	0	1	0	1	0	0
0	1	1	1	1	1	0
1	1	1	1	1	0	1

Sample:

```

4 7
0 1 0 1 1 1 1
1 0 1 0 1 0 0
0 1 1 1 1 1 0
1 1 1 1 1 0 1
There are 2 bingo grids.

```