

Design a class named **MyPoint** to represent a point with x- and y-coordinates. The class contains:

- The data fields **x** and **y** that represent the coordinates with getter methods.
- A **no-arg constructor** that creates a point (0, 0).
- A **constructor** that constructs a point with specified coordinates.
- A method named **distance** that returns the distance from this point to a specified point of the **MyPoint** type.
- A method named **distance** that returns the distance from this point to another point with specified **x**- and **y**-coordinates.

Write a test program that creates the two points (0, 0) and (10, 30.5) and displays the distance between them.

Define the **Triangle2D** class that contains:

- Three points named **p1**, **p2**, and **p3** of the type **MyPoint** with getter and setter methods. (**MyPoint** is defined in previous exercise.)
- A **no-arg constructor** that creates a default triangle with the points **(0, 0)**, **(1,1)**, and **(2, 5)**.
- A **constructor** that creates a triangle with the **specified points**.
- A method **getArea()** that returns the area of the triangle.
- A method **getPerimeter()** that returns the perimeter of the triangle.

Write a test program that creates a **Triangle2D** object **t1** using the constructor **new Triangle2D(new MyPoint(2.5, 2), new MyPoint(4.2, 3), new MyPoint(5, 3.5))**, displays its **area** and **perimeter**.

Hint: Area of a triangle is:

$$s = (side1 + side2 + side3) / 2$$

$$area = \sqrt{s(s - side1)(s - side2)(s - side3)}$$

Design a class named **Person** and its two subclasses named **Student** and **Employee**. Make **Faculty** and **Staff** subclasses of **Employee**. A person has a name, address, phone number, and email address. A student has a class status (freshman, sophomore, junior, or senior). Define the status as a constant. An employee has an office, salary, and date hired. Use the **java.util.Date** class to create an object for date hired. A faculty member has office hours and a rank. A staff member has a title. Override the **toString** method in each class to display the class name and the person's name.

Write a test program that creates a **Person**, **Student**, **Employee**, **Faculty**, and **Staff**, and invokes their **toString()** methods.

The **String** class is provided in the Java library. Provide your own implementation for the following methods (name the new class **MyString**):

- `public MyString1(char[] chars);`
- `public char charAt(int index);`
- `public int length();`
- `public MyString1 substring(int begin, int end);`
- `public MyString1 toLowerCase();`
- `public boolean equals(MyString1 s);`
- `public static MyString1 valueOf(int i);`

Design a class named **Triangle** that extends **GeometricObject**. The class contains:

- Three **double** data fields named **side1**, **side2**, and **side3** with default values **1.0** to denote three sides of the triangle.
- A **no-arg constructor** that creates a default triangle.
- A **constructor** that creates a triangle with the specified **side1**, **side2**, and **side3**.
- The accessor methods for all three data fields.
- A method named **getArea()** that returns the area of this triangle.
- A method named **getPerimeter()** that returns the perimeter of this triangle.
- A method named **toString()** that returns a string description for the triangle. The **toString()** method is implemented as follows:
 - `return "Triangle: side1 = " + side1 + " side2 = " + side2 + " side3 = " + side3;`

Write a test program that prompts the user to enter three sides of the triangle, a color, and a Boolean value to indicate whether the triangle is filled. The program should create a **Triangle** object with these sides and set the **color** and **filled** properties using the input. The program should display the area, perimeter, color, and true or false to indicate whether it is filled or not.