King Abdulaziz University
Faculty of Engineering
Electrical and Computer Engineering
EE-202-Object-Oriented Computer Programming

Lab-6

Q-1 For each of the following problems, write a program or a program segment that performs the specified action.

1. Write an empty class declaration for a class named Student.
2. Declare five instance variables in the class: A String variable for the first name, a String variable for the last name and three double variables that are used to store a student's exam grades.
3. In the class, declare a constructor that takes five parameters—two Strings and three doubles. Use these parameters to initialize the instance variables declared earlier.
4. Modify the class to include a get and a set method for each of the instance variables in the class.
5. Modify the class to include a getAverage method that calculates and returns the average of the three exam grades.
6. Declare an empty test class to use the capabilities of your new Student class
7. In the test class, declare a main method that creates an instance of class Student.
8. Add statements to the main method to test class Student's get methods. Output the name and average for the student.
9. Add statements to the main method that test the set methods of class Student, then output the new name and average of the Student object to show that the set methods worked correctly.

Sample Output: Use the constructor to initialize the instance variables, then use the get methods to change the values

```
Hello Khalid Al-Shuaibi, Your Avg grade is: 89.3.
Khalid Al-Shuaibi, Your new grade is: 90.0.
```

Answer:

```java
package lab6;

public class Student {

	private String firstName;
	private String lastName;
	private double exam1, exam2, exam3;

	public Student ( String firstName,
	                 String lastName,
	                 double exam1,
	                 double exam2,
	                 double exam3) {

	     this.firstName = firstName;
	     this.lastName = lastName;
	     this.exam1 = exam1;
	     this.exam2 = exam2;
	     this.exam3 = exam3;
	}

	public String getFirstName() {
	    return firstName;
	    }
	public void setFirstName(String firstName) {
	    this.firstName = firstName;
	}
	public String getLastName() {
	    return lastName;
	}
	public void setLastName(String lastName) {
	    this.lastName = lastName;
	    }
	public double getExamGrade1() {
	    return exam1;
	}
	public void setExamGrade1(double exam1) {
	    this.exam1 = exam1;
	}
	public double getExamGrade2() {
	    return exam2;
	}
	public void setExamGrade2(double exam2) {
	    this.exam2 = exam2;
	}
	public double getExamGrade3() {
	    return exam3;
	}
	public void setExamGrade3(double exam3) {
	    this.exam3 = exam3;
	}
	public double getAverage(){
	    double Avg = ((exam1+exam2+exam3)/3.0);
	    return Avg;
	}
}
```

```java
package lab6;

public class StudentTest {

    public static void main(String[] args) {

        Student student1 = new Student("Hayan","Al-Machnouk", 95.5, 98.5, 94.5);
        System.out.printf("Hello %s %s, Your Avg garde is: %.1f.%n",
                student1.getFirstName(),student1.getLastName(),student1.getAverage());

        student1.setExamGrade1(97);
        student1.setExamGrade2(100);
        student1.setExamGrade3(95);

        System.out.printf("%s %s, Your new Avg garde is: %.1f.%n",
                student1.getFirstName(),student1.getLastName(),student1.getAverage());
    }
}
```

Problems | Debug Shell | Console × | Terminal

<terminated> StudentTest [Java Application] C:\Users\Hayan\.p2\pool\plugins\org.eclipse.justj.openjdk.hotsp

```
Hello Hayan Al-Machnouk, Your Avg garde is: 96.2.
Hayan Al-Machnouk, Your new Avg garde is: 97.3.
```

Q-2 A teacher wants a program to keep track of grades for students and decides to create a student class for his program as follows:

- Each student will be described by three pieces of data: his/her name, his/her score on test #1, and his/her score on test#2.
- There will be one constructor, which will have one argument—the name of the student.
- There will be three methods:
  - getName, which will return the student's name
  - inputGrades, which will prompt for and read in the student's test grades
  - getAverage, which will compute and return the student's average

File Student.java contains an incomplete definition for the Student class. Save it to your directory and complete the class definition as follows:

1. Declare the instance data (name, score for test1, and score for test2).
2. Create a Scanner object for reading in the scores.
3. Add the missing method headers.
4. Add the missing method bodies.

File Grades.java contains a shell program that declares two Student objects. Save it to your directory and use the inputGrades method to read in each student's test scores, then use the getAverage method to find their average. Print the average with the student's name, e.g., "The average for Joe is 87." You can use the getName method to print the student's name.

Add statements to your Grades program that print the values of your Student variables directly, e.g.:

```
System.out.println("Student 1: " + student1);
```

This should compile, but notice what it does when you run it—nothing very useful! When an object is printed, Java looks for a toString method for that object. This method must have no parameters and must return a String. If such a method has been defined for this object, it is called and the string it returns is printed. Otherwise the default toString method, which is inherited from the Object class, is called; it simply returns a unique hexadecimal identifier for the object such as the ones you saw above.

Add the following toString method to Student class

```
public String toString()
    {
        return "Name: " + name + "   Test 1: " + test1 + "   Test 2: " + test2;
        }
```

Recompile your Student class and the Grades program (you shouldn't have to change the Grades program—you don't have to call toString explicitly). Now see what happens when you print a student object—much nicer!

Sample Output:

```
Enter Mary's score for test 1: 44
Enter Mary's score for test 2: 33
The average for Mary is 38.5.

Enter Mike's score for test 1: 22
Enter Mike's score for test 2: 55
The average for Mike is 38.5.

Student 1: Name: Mary   Test 1: 44   Test 2: 33
Student 2: Name: Mike   Test 1: 22   Test 2: 55
```

Answer

Grades.java

```
1  package lab6;
2  //*************************************************************
3  //Grades.java //
4  //Use Student class to get test grades for two students
5  //and compute averages //
6  //*************************************************************
7  public class Grades {
8
9      public static void main(String[] args) {
10
11     Students student1 = new Students("Mary");
12     student1.inputGrades();
13     student1.getAverage();
14
15     Students student2 = new Students("Mike");
16     student2.inputGrades();
17     student2.getAverage();
18
19     System.out.println("Student 1: " + student1.toString());
20     System.out.println("Student 2: " + student2.toString());
21     }
22 }
```

Students.java

Problems | Debug Shell | Console | Terminal

```
<terminated> Grades [Java Application] C:\Users\Hayan\.p2\pool\plugins\or
Enter Mary's score for test 1: 44
Enter Mary's score for test 2: 33
The average for Mary is 38.5.

Enter Mike's score for test 1: 22
Enter Mike's score for test 2: 55
The average for Mike is 38.5.

Student 1: Name: Mary Test 1: 44 Test 2: 33
Student 2: Name: Mike Test 1: 22 Test 2: 55
```

Grades.java | Students.java ×

```java
package lab6;

import java.util.Scanner;

public class Students {

    String firstName;
    int testGrade1;
    int testGrade2;
    Scanner input = new Scanner(System.in);

    public Students(String firstName) {
    this.firstName = firstName;
    }

    public void inputGrades() {
    System.out.print("Enter "+ firstName +"'s score for test 1: ");
    this.testGrade1 = input.nextInt();
    System.out.print("Enter "+ firstName +"'s score for test 2: ");
    this.testGrade2 = input.nextInt();
    }

    public void getAverage() {
    double Avg =(testGrade1+testGrade2)/2.0;
    System.out.printf("The average for %s is %.1f.%n%n",firstName,Avg);
    }

    public String getFirstName() {
    return firstName;
    }

    public String toString() {
    return "Name: " + firstName + " Test 1: " + testGrade1 + " Test 2: " + testGrade2;
    }
}
```