

Project 9 - 20 points

Write a Java user-defined class called `Student` and a class tester called `p9`. These will be separate Java source files (`p9.java` and `Student.java`). The `Student` class will consist of the following instance variables:

```
private String name;  
private int test1, test2, finalExam;  
private double average;
```

You will write the code for the following methods of the `Student` class:

```
public String toString();  
public void setTest1(int t);  
public void setTest2(int t);  
public void setFinal (int finalExam);  
public void setGrades(int t1, int t2, int f);  
public void setName(String name);  
public int getTest1();  
public int getTest2();  
public int getFinal();  
public String getName();  
public double getAverage();  
private void doAverage();
```

[Note that `setFinal()` and `setName` must use the `this` reference.]

In addition you will write code for the following constructors of the `Student` class:

```
public Student();  
public Student(String name);  
public Student(String name, int test1, int test2, int  
finalExam);
```

[Note that the last two constructors must use the `this` reference.]

Whenever a grade is changed, you should call `doAverage()` which recalculates the average for that object. This should also be done with the constructors. This will guarantee an up to date average for the user.

The default values for grades should always be zero when not specified. Name should be the empty string (“”) when not provided.

The toString() method should return a String in the form:

“Name has test grades test1, test2 and finalExam and an average of average.”

The program p9.java will exercise the Student class with reference variables student1, student2 and student3.

With the student1 reference variable, perform the following:

- Use the Student() constructor.
- Use the setName(), setTest1(), setTest2() and setFinal() mutator methods with the values “Bob Stevens”, 89, 92 and 93 respectively.
- Use the getName(), getTest1, getTest2(), getFinal() and getAverage() accessor methods to verify the mutators.
- Test the toString() method.

With the student2 reference variable, perform the following:

- Use the Student(String name) constructor with “James Kline”.
- Use the setGrades() mutator method with values 75, 66 and 89 respectively.
- Use the getName(), getTest1, getTest2(), getFinal() and getAverage() accessor methods to verify the mutator.
- Test the toString() method.

With the student3 reference variable, perform the following:

- Use the Student(String name, int test1, int test2, int finalExam) constructor with the values “Nancy Keen”, 94, 97 and 100 respectively.
- Use the setTest() mutator method to correct the first test grade from 94 to 95.
- Use the getName(), getTest1, getTest2(), getFinal() and getAverage() accessor methods to verify the constructor and mutator.
- Test the toString() method.

Your output should look something like this:

```
student1.getName() = Bob Stevens
student1.getTest1() = 89
student1.getTest2() = 92
student1.getFinal() = 93
student1.getAverage() = 91.333
```

Bob Stevens has test grades 89, 92 and 93 and an average of 91.333

```
student2.getName() = James Kline  
student2.getTest1() = 75  
student2.getTest2() = 66  
student2.getFinal() = 89  
student2.getAverage() = 76.667  
James Kline has test grades 75, 66 and 89 and an average of 76.667
```

```
student3.getName() = Nancy Keen  
student3.getTest1() = 95  
student3.getTest2() = 97  
student3.getFinal() = 100  
student3.getAverage() = 97.333  
Nancy Keen has test grades 95, 97 and 100 and an average of 97.333
```

Comment all sections. No comments mean lost points!

You project files should be called **Student.java** and **p9.java** and submitted as:

```
$ submit jojo p9.java  
$ submit jojo Student.java
```