King Fahd University of Petroleum and Minerals
College of Computer Science and Engineering
Information and Computer Science Department
Second Semester 2005/2006 (052)
ICS 102 – Introduction to Computing

Major Exam 02
Thursday, 27 April 2006
Time: 90 minutes

Name:

ID#:

Please *circle* your section number below:

Section	01	02	03	04	06	07	08	09
Instructor Name	Salahadin	Sukairi	Sukairi	Alvi	Salahadin	Sebakhy	Sebakhy	Sukairi
Day and Time	UT 8-8:50	SM 9-9:50	SM 11-11:50	UT 9-9:50	UT 9-9:50	UT 10-10:50	SM 1:10-2	SM 1:10-2

Question #	Maximum Marks	Obtained Marks
1	10	
2	10	
3	10	
4	20	
Total	50	

Q. 1: [**10 marks**] Write a class **SomeFunctions** that has the following methods:

(a) [**4 marks**] a static method *computeSumCube(int n)* that finds and returns the following sum:

$$1^3 + 2^3 + 3^3 + \ldots + n^3.$$

(b) [**4 marks**] a static method *countVowel(String x)* that finds and returns the number of vowels in a String *x*. (a vowel is one of the letters: *a, e, i, o, u*).

(c) [**2 marks**] Write another class **TestFunctions** that tests the methods of the class **SomeFunctions** using the main method.

Q. 2: [**10 marks**] Design and implement a class called **CD**. The class **CD** has the following instance variables: *dataSize* (the number of megabytes the **CD** stores currently), *maximumCapacity* (the maximum number of megabytes that can be stored in the **CD**) and *title* of the **CD**.

Include the following methods in your class:

- [**2+2 marks**] two constructors to initialize the **CD**: (i) with *title* and *dataSize* and (ii) with *title* only.

- [**3 marks**] a method *howMuchFull()* that returns back the percentage of **CD** that is full. (0-100%).

- [**3 marks**] a *toString()* method that returns back the title of the **CD**, the size of data in megabytes and the percentage of **CD** that is full.

Q. 3: [**10 marks**] Design and implement a class **Student** with the following: Three instance variables: *name*, *numberOfQuizzes* and *totalScore*. Include the following methods in your class:

- [**2+2 marks**] Two constructors: (i) *Student(String name)* and (ii) *Student(String name, int numberOfQuizzes, double totalScore)*

- [**2 marks**] *addQuiz (double score)* to add a quiz score.

- [**2 marks**] *getTotalScore( )* to get the total score of the student.

- [**2 marks**] *getAverageScore( )* to get the average of the student.

Q. 4: [**20 marks**] Write a class called **Triangle** with the following instance variables: the three sides of the triangle *a*, *b* and *c*. Include the following methods in your class:

- [**1 mark**] a constructor to initialize the three sides of the triangle.

- [**1 mark**] a default constructor.

- [**3 marks**] accessor and mutator methods.

- [**2 marks**] a method to calculate and return the perimeter. (the sum of the sides of the triangle).

- [**3 marks**] a method to calculate and return the area. The formula for the area is:

Let $s = \dfrac{1}{2}\ (a + b + c)$.

Then $area = \sqrt{s(s - a)(s - b)(s - c)}$

- [**3 marks**] a method *type( )* that returns back the type of the triangle as follows:
    o "**Equilateral Triangle**" if all of the three sides are equal to each other.
    o "**Isosceles Triangle**" if any two of three sides are equal to each other, but the third side is unequal.
    o "**Scalene Triangle**" if all of the three sides are not equal to each other.

- [**2 marks**] a boolean method *isRightTriangle( )* if the sum of the squares of any two of its sides is equal to the square of the third side. i.e. $side1^2 = side2^2 + side3^2$ is satisfied where side1, side2 and side3 are any of *a*, *b* or *c*.

- [**2 marks**] a *toString()* method that returns the area, the perimeter and the type of the triangle.

- [**3 marks**] a boolean method *equals(Triangle t)* that checks if the current object (**this**) is equal to the triangle *t*. (Two triangles are the equal if the three sides of one triangle are equal to the three sides of the other triangle. The order of the sides does not matter).