Test for Thursday 21st

Attempt all Questions

Question 1

You have been asked to maintain an existing system and have been presented with the object-oriented code below. To aid your understanding of the system draw a class diagram to represent this information:

```
public class Module {
        private int moduleCode;
        private String moduleName;
        private int noOfCredits = 20;
        public Module(int mno, String name)
        {
                moduleCode=mno; moduleName=name;
        }
         public Module(int mno, String name, int noc)
        {
                 moduleCode=mno;
                moduleName=name;
                 noOfCredits = noc;
        }
 }
public class Student
{
        private int studentNo;
        private String studentName;
        private static int studentCount = 0;
        public Student(int sno, String name)
        {
        studentNo=sno;
        studentName=name;
        studentCount++;
        }
}
public class Registration
{
        private Student aStudent;
        private Module aModule;
        private int result;
        public Registration(Student s, Module m) {
                aStudent = s;
                aModule = m;
        }
        public void setResult (int mark) {
                if ((mark >= 0) && (mark <=100))
                        result = mark;
                 else
                        System.out.println("ERROR: not a valid mark");
                }
}
```
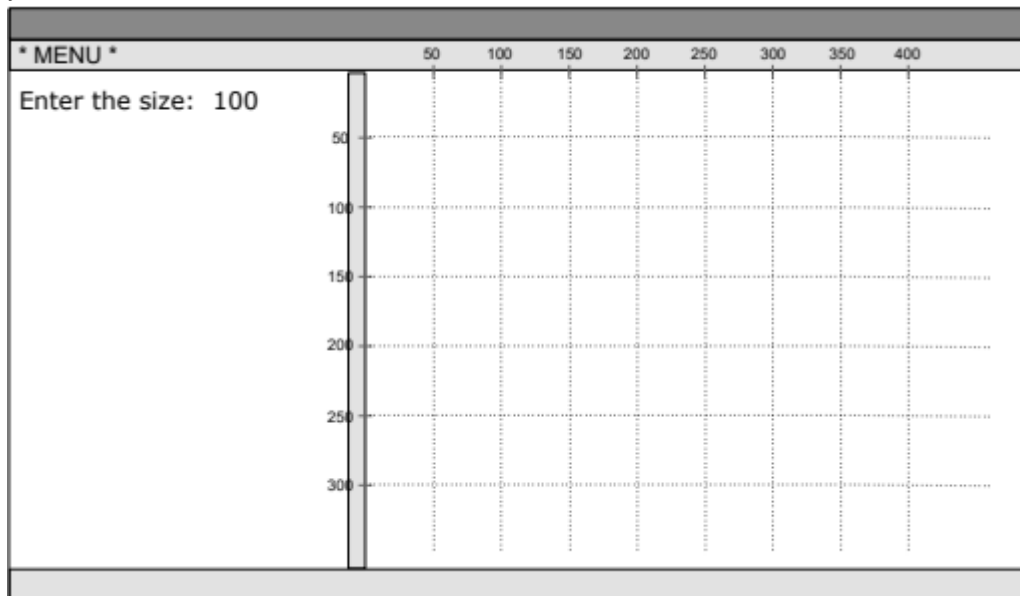
Question 2

Write a class named Array that contains an array of integers as data member. The class contains the following member functions:

- A constructor that initializes the array element to 0
- Input function to input the values in the array.
- Display function to display the values of array
- A member function to make Odd values of the array three times (multiply by 3)

Question 3

Sketch what the following drawIt() method will draw in the graphics pane, if the user types 100 when asked for the size?

```
public static final double width = 50;
public void drawIt()
{
        double size = UI.askDouble("Enter the size:");
        UI.drawRect(250, 150, width, size );
        UI. fillOval (150, 50, size , width);
        UI.drawLine(width, size , width, 2 * size );
}
```

Question 4

Suppose our task is to write code to read a sentence from the user and print out the words in the sentence one word per line of output. It prints the words only: it doesn't print the period at the end of the sentence.

A sentence is one or more words ending with a period. For example:

user input (Test case 1):

This is a sentence.

output for Test case 1:

This
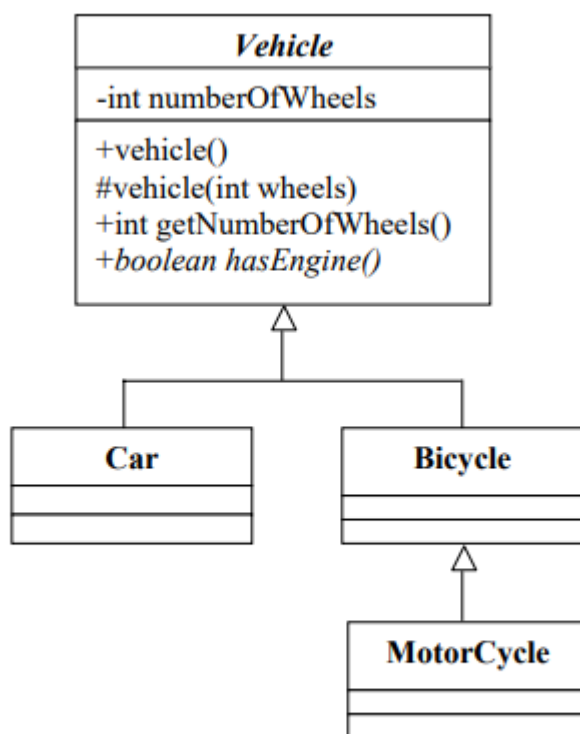
is

a

sentence

Question 5

Figure 1: A class hierarchy

Consider the class hierarchy of vehicles shown in Figure 1, with the following additional information:

  • Cars always have four wheels;
  • Bicycles and their subclasses always have two wheels.

Note: there are only default (i.e. parameter-less) constructors available to the clients of the hierarchy.

 (a) Convert the hierarchy of Figure 1 to Java

 (b) Describe overriding and method overloading. Write some code to show an example.

(a) Write the definition of a class called 'Point' in Java. The class should contain the following:-

    (i)   Two integer variables x and y declared as protected.

    (ii) The class Point has a public no-argument constructor to set the coordinates at the Origin (0, 0).

    (iii) A second constructor with 2 parameters to set the coordinates of the point at the location defined by the parameters.

    (iv) A public method to set the coordinates of the point at the location defined by the global protected variables *x* and *y*.

    (v)   A public get method to return the x-coordinate.

    (vi) A public get method to return the y-coordinate.

    (vii) A public String method to return the location of the point.

(b) Write the definition of a class called 'Circle' which inherits from the class Point.

The class Circle should contain the following:-

    (i)   A protected variable for the radius of the circle.

    (ii) A no-argument constructor to set the radius to 0.

    (iii) A constructor containing 3 parameters and which calls the superclass constructor with the values and to set the radius.

    (iv) A public method to set the radius of the circle.

    (v) A public method to return the value of the radius.

    (vi) A public method to compute the area of the circle.

    (vii) A String method to return the location of the centre of the circle and its radius.

(c) Write the code for a test class to pass the different values of radius and coordinates and to compute the area of the circle.

Question 7

Using Java write a class Date with the following features.
i)   Three integer data members, for day, month and year.
ii) A default constructor to initialise a Date object to zero day, month and year.
iii) A general constructor to initialise a Date object to a specified Date.
iv) A member function that prints a date in the format "dd/mm/yyyy".
v)   Write a main class that implements the above class.

Question 8

Below is the class representation for a **Dice**, which when rolled will randomly show a value between 1 to 6:

```
┌─────────────────┐
│      Dice       │
├─────────────────┤
│ outcome         │
├─────────────────┤
│ roll()          │
│ show()          │
│ getOutcome()    │
└─────────────────┘
```

(i)   Write a complete Java class definition, **Dice**, including the attribute and methods shown above, and a default constructor.

(ii) In a game of dice, if the outcome of the simultaneous roll of two dice is two sixes, then you win. Write a Java program <u>fragment</u> to simulate this using the Dice class definition in (i) above.