Question 1 (10 marks): Electricity Company wants to manage bills; we create the shown UML class Electricity_Bill containing the following attributes:

- id: customer account number (example: id = "546234").
- kwatts: kilowatts used (example: kwatts = 3000).

<table>
<thead>
<tr>
<th>Electricity_Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>- id : String</td>
</tr>
<tr>
<td>- kwatts: double</td>
</tr>
</tbody>
</table>

```java
class Electricity_Bill{
    String id;
    double kwatts;

    public Electricity_Bill(String id){
        this.id = id;
    }

    public double compute_Electricity_Charge(){
        // Computes electricity charge based on the table below
    }

    public double difference(Electricity_Bill eBill){
        // Returns the difference in Riyal between current and eBill
    }

    public void isSaving(Electricity_Bill eBill){
        // Displays message if current bill is less charged than eBill
    }

    public void display_Bill(){
        // Displays electricity bill
    }
}
```

Methods:

- `compute_Electricity_Charge()`: returns the electricity charge in Riyal for a consuming kilowatt-hours by using the following table:

<table>
<thead>
<tr>
<th>Charge kilowatt/hour in Riyal</th>
<th>Kilowatts</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>0 - 4000 (The first 4000 kilowatts)</td>
</tr>
<tr>
<td>0.10</td>
<td>Between 4000 and 6000</td>
</tr>
<tr>
<td>0.30</td>
<td>More than 6000</td>
</tr>
</tbody>
</table>

- `difference(Electricity_Bill eBill)`: this method returns the difference in Riyals between the electricity charge of current Electricity Bill and the electricity charge eBill.

- `isSaving(Electricity_Bill eBill)`: this method displays a message telling us whether the current bill is less charged than eBill or not.

- `display_Bill()`: this method displays an electricity bill (see the following two examples)

```
Electricity Bill
customer number: 546234
Consumed Kilowatts: 3000 kilowatts Electricity charge: 150 Riyals

Electricity Bill
customer number: 765443
Consumed Kilowatts: 8000 kilowatts Electricity charge: 1000 Riyals
Note: you have exceeded more than 6000. For that your bill is more charged
```

Write in Java the class Electricity_Bill

Answer:
Question 3: (continue of question 2).

We assume that the class Car (in question 2) is written in Java.

The question is: write in Java the class TestCar that processes the following tasks:

a. Read information of two cars.
b. Display a message telling us which car is more economic.
c. Display information of the car, which has the minimum distance.
d. Display the remaining gallons of the car, which has minimum distance.
e. Read n the number of cars to be processed.
f. Read the information of all the cars.
g. Display the id of the car, which has the maximum value of remaining gallons.

Answer:
Question 4 (8 marks): Give the output of the following program

```java
public class Sayara {
    private int id;
    private String owner;
    private double milage, fuel;
    private double consuming;
    private static int nbSayarat = 0;
    public Sayara(String o, double m, double f, double c ) {
        nbSayarat ++;
        id = nbSayarat;
        owner = o;
        milage = m;
        fuel = f;
        consuming = c;
        display( );
    }
    public void go( double d ) {
        double x = fuel / consuming * 100;
        System.out.print(owner + "'s Car >>> id : ");
        System.out.print("requested distance : "+d);
        System.out.print(" , available fuel : "+fuel);
        System.out.println( " , possibly distance = "+x);
        if (x < d) {
            fuel = fuel - consuming * x / 100.0;
            milage += x;
        }
        else {
            fuel = fuel - consuming * d / 100.0;
            milage += d;
        }
    }
    public void display( ){
        System.out.print(owner + "'s Car >>> id : ");
        System.out.println( " , milage : "+milage +" , fuel : "+fuel);
    }
}
```

--- TestSayara.Java

```java
public class TestSayara {
    public static void main(String[] args) {
        line 1. Sayara fathersCar = new Sayara("Mohammad", 200.0, 25.00, 5.0);
        line 2. Sayara sonsCar = new Sayara("Ibrahim", 100.0, 40.00, 10.0);
        line 3. fathersCar.go(800.0);
        line 4. sonsCar.go(200.0);
        line 5. fathersCar.display();
        line 6. sonsCar.display();
    }
}
```
**Output**

Mohammad's car >>> id: 1, milage: 200.0, fuel: 25.0

Ibrahim's car >>> id: 2, milage: 100.0, fuel: 40.0

Mohammad's car >>> requested distance: 800.0, consuming rate: 5.0, available fuel: 25.0, possibly distance = 500.0

Ibrahim's car >>> requested distance: 200.0, consuming rate: 10.0, available fuel: 40.0, possibly distance = 400.0

Mohammad's car >>> id: 1, milage: 700.0, fuel: 0.0

Ibrahim's car >>> id: 2, milage: 300.0, fuel: 20.0