MIDTERM

CMPS251 Object-Oriented Programming
Fall 2022

Department of Computer Science and Engineering
College of Engineering
QATAR UNIVERSITY

Student Name	
Student QUID	

50 minutes on-paper closed-book, no extra material or resources

Question	*Allocated points*	*Obtained points*
Q.1	5	
Q.2	5	
Q.3	5	
Q.4	5	
Q.5	5	
Total	***25***	

Q.1 Write the missing code of the needed classes to enable this code to run and does what it is supposed to do without errors.

```
public class Q1 {
  public Q1() {
    Vehicle v1 = new Vehicle(1621732); //plateNo
    v1.setOwner(new Owner("Huda Abdullah"));
    v1.getOwner().setId("12400007355");
    Vehicle v2 = new Vehicle();
    //deep copy of v1 saved in v2
    v1.copy(v2);
  }

  public static void main(String[] args) {
    new Q1();
  }

}
```

Write your answer on the next two pages.

```
public class Owner {

}
```

```
public class Vehicle {



}
```

Q.2 Consider the class **Employee** below to add the needed code for the below tasks. Notice that the *employees* list is static and its purpose is to save the references to **Employee** created objects.

(a) Code the body of the first constructor such that it insures every created **Employee** object is added to the *employees* static list and is assigned a proper employment ID, `employeeId`, taking advantage of the *serialNo* static class variable.

(b) Code the body of the second constructor receiving the `name` and `salary` of an employee. This constructor should take advantage of the first constructor and also should set the `name` and `salary`.

(c) Code the body of the method `increase`. This method increases, by a specified percentage `increment`, the salary of employees whose salary is below a specified value, `salary`. This method should return the total number of benefited employees from this increase.

```
import java.util.ArrayList;

public class Employee {

  private String name;
  private double salary;
  private int employeeId;
  private static int serialNo = 100;

  static ArrayList<Employee> employees = new ArrayList<Employee>();

  public String getName() { return name; }
  public void setName(String name) { this.name = name; }
  public double getSalary() { return salary; }
  public void setSalary(double salary) { this.salary = salary; }


  public Employee() {
  /* (a) */









  }
```

```
    public Employee(String name, double salary) {
    /* (b) */









    }

    public int increase(int increment, double salary) {
    /* (c) */

 }

}//end of class
```

Consider the classes on the last page of this exam in answering **Q3**, **Q4**, and **Q5**. Each of these questions asks to you code a method in the class `Registration`. Therefore, it is important for you to remember that you are inside the class `Registration` when coding these methods.

```
import java.util.ArrayList;
public class Registration {
  private ArrayList<Transcript> transcripts = new ArrayList<>();
  public Registration() {     }

  /* Q.3 */

  /* Q.4 */

  /* Q.5 */


}
```

Q.3 Write the method `m1` that returns a list of `Student` objects with a `CE` major who passed a specified course, given its code `courseCode`, and passed a minimum total number of chs, `minChs`.

Q.4 Write the method `m2` that calculates the GPA of a student, given the student's id, `id` , using the formula: `gpa` = Sum(grade*chs)/Sum(chs) and returns the `gpa`.

Q.5 Write the method `m3` that returns an array having the average, of male, female, and all students of CS major who took the course Math 102 in Fall 2021.

```java
import java.util.ArrayList;
public class Registration {
  private ArrayList<Transcript> transcripts = new ArrayList<Transcript>();
  public Registration() {    }

  /* Q.3 */

  /* Q.4 */

  /* Q.5 */

}
```

```java
import java.util.ArrayList;
public class Transcript {
  private Student student;
  private ArrayList<TranscriptEntry> entries = new ArrayList<TranscriptEntry>();
  public Transcript() {
  // TODO Auto-generated constructor stub
  }
  public Student getStudent() { return student; }
  public void setStudent(Student student) { this.student = student; }
  public ArrayList<TranscriptEntry> getEntries() { return entries; }
  public void setEntries(ArrayList<TranscriptEntry> entries) {
       this.entries = entries;
  }
}
```

```java
public class TranscriptEntry {
  private Course course;
  private int grade;//out of 100
  private int year;
  private String semester;
  public TranscriptEntry() {
  // TODO Auto-generated constructor stub
  }

  public Course getCourse() { return course; }
  public void setCourse(Course course) { this.course = course; }
  public int getGrade() { return grade; }
  public void setGrade(int grade) { this.grade = grade;  }
  public int getYear() { return year; }
  public void setYear(int year) {  this.year = year; }
  public String getSemester() {    return semester; }
  public void setSemester(String semester) {  this.semester = semester;   }
}
```

```java
public class Student {
  private String name;
  private Gender gender;
  private String id;
  private String major;
  public Student() {    }
  public String getName() { return name }
  public void setName(String name) { this.name = name;  }
  public Gender getGender() { return gender; }
  public void setGender(Gender gender) { this.gender = gender; }
  public String getId() { return id; }
  public void setId(String id) { this.id = id; }
  public String getMajor() { return major; }
  public void setMajor(String major) { this.major = major; }
}

enum Gender {
  Male, Female
}


public class Course {
  private String courseCode;
  private String courseTitle;
  private int chs;
  public Course() {     }
  public String getCourseCode() { return courseCode; }
  public void setCourseCode(String courseCode) {
        this.courseCode = courseCode;
  }
  public String getCourseTitle() { return courseTitle; }
  public void setCourseTitle(String courseTitle) {
        this.courseTitle = courseTitle;
  }
  public int getChs() { return chs; }
  public void setChs(int chs) { this.chs = chs; }
}
```