Exercise – Array of Objects

1. Define and encapsulate the following class called *student*. Include fields for the following data:
   last name;
   age;
   Student number
   Average;

   Create a constructor that will initialize *last name* to "MRSX" and *age* to 18 as well as initializing *student number* to 555555 and *average* to 0.0. Create all necessary instance methods to access and change the data. Do not allow the programmer to manipulate the fields in any manner that is appropriate to the data it is meant to hold (e.g. a negative average). Create an instance method that will print an object of type *student*.

```
class Student {
	String lastName;    //Stores student last name
	int age;                    //Stores student age
	int studentNumber;  //Stores student #
	double average;             //Stores student average

	/*
	 * This constructor initializes the class fields
	*/
	public Student () {
		lastName = "MRSX";
		age = 18;
		studentNumber = 555555;
		average = 0;
	}

	/*
	 *This accessor method returns the last name of the student
	 *pre : none
	 *post: last name
	*/
	public String displayName () {
		return lastName;
	}

	/*
	 *This accessor method returns the age of the student
	 *pre : none
	 *post: age
	*/
	public int displayAge () {
		return age;
	}
```

```java
	/*
	 *This accessor method returns the student number of the student
	 *pre : none
	 *post: student number
	*/
	public int displayStudentNumber () {
		return studentNumber;
	}

	/*
	 *This accessor method returns the average of the student
	 *pre : none
	 *post: average
	*/
	public double displayAverage () {
		return average;
	}

	/*
	 *This mutator method edits the name of the student
	 *pre : name
	 *post: none
	*/
	public void editName (String name) {
		lastName = name;
	}

	/*
	 *This mutator method edits the age of the student
	 *pre : age
	 *post: none
	*/
	public void editAge (int age) {
		if (age <= 0)
			this.age = 18;
		else
			this.age = age;
	}

	/*
	 *This mutator method edits the student number of the student
	 *pre : student number
	 *post: none
	*/
	public void editStudentNumber (int number) {
		if (number < 0)
			studentNumber = Math.abs(number);
		else
			studentNumber = number;
	}

	/*
	 *This mutator method edits the average of the student
	 *pre : average
	 *post: none
```

```
        */
        public void editAverage (double average) {
                if (average > 100 || average < 0)
                        average = 0;
                else
                        this.average = average;
        }
}
```

2. In your main program, prompt the user to enter the number of students the user wants to enter data for. Define and create an array of students specified by the user.

    a. Using mutator methods, enter the data for the students.
    b. Provide the following menu to the user:
        i. Edit student (search by student number)
        ii. Print average of all students
        iii. Print list of students

```
Scanner input = new Scanner (System.in);
                System.out.println("Enter the number of students:");
                int count = Math.abs(input.nextInt());
                Student [] student = new Student[count];

                for (int x = 0; x < count; x++) {
                        student [x] = new Student();
                        System.out.println("Enter student " + (x+1) + "
name:");
                        String name = input.next();
                        System.out.println("Enter student " + (x+1) + " age:");
                        int age = input.nextInt();
                        System.out.println("Enter student " + (x+1) + " student
#:");
                        int studentNumber = input.nextInt();
                        System.out.println("Enter student " + (x+1) + "
average:");
                        int average = input.nextInt();
                        student[x].editName(name);
                        student[x].editAge (age);
                        student[x].editStudentNumber(studentNumber);
                        student[x].editAverage(average);
                }

                System.out.println("\t\t*MENU*");
                System.out.println("1 - Edit student (search by student
number)");
                System.out.println("2 - Print average of all students");
                System.out.println("3 - Print list of students");

                int option;
                do {
```

```
                    option = input.nextInt();
                    if (option > 3 || option < 1 ) {
                          System.out.println("Invalid option");
                          System.out.println("Please enter a valid option
between 1 - 3");
                    }
              }
              while (option > 3 || option < 0);

              if (option == 1) {
                    System.out.println ("Enter student number of the
student you wish to edit");
                    int studentNumber = input.nextInt();
                    int studentIndex = 0;
                    for (int x = 0; x < student.length; x++) {
                          if (studentNumber ==
student[x].displayStudentNumber()) {
                                studentIndex = x;
                                break;
                          }
                          else {
                                studentIndex = -1;
                          }
                    }

                    if (studentIndex >= 0) {
                          System.out.println("\t\t*ENTER EDIT*");
                          System.out.println("1 - Edit Name");
                          System.out.println("2 - Edit Age");
                          System.out.println("3 - Edit Student Number");
                          System.out.println("4 - Edit Average");
                          do {
                                option = input.nextInt();
                                if (option > 4 || option < 1 ) {
                                      System.out.println("Invalid
option");
                                      System.out.println("Please enter a
vlid option between 1 - 4");
                                }
                          }
                          while (option > 4 || option < 1);

                          if (option == 1) {
                                System.out.println ("Enter student new
Name:");
                                String name = input.next();
                                student[studentIndex].editName(name);
                          }
                          else if (option == 2) {
                                System.out.println ("Enter student new
Age:");
                                int age = input.nextInt();
                                student[studentIndex].editAge(age);
                          }
                          else if (option == 3) {
```

```
                                    System.out.println ("Enter student new
Student Number:");
                                    studentNumber = input.nextInt();

      student[studentIndex].editStudentNumber(studentNumber);
                              }
                              else if (option == 4) {
                                    System.out.println ("Enter student new
Average:");
                                    double average = input.nextDouble();

      student[studentIndex].editAverage(average);
                              }
                              System.out.println("Student successfully
edited");
                        }
                  }
                  else if (option == 2) {
                        double average = 0;
                        for (int x = 0; x < student.length; x++) {
                              average = average + student[x].displayAverage();
                        }
                        average = average/student.length;
                        System.out.println("The average of all students is " +
average + "%");
                  }
                  else if (option == 3) {
                        System.out.println("\t\t*STUDENT LIST*");
                        for (int x = 0; x < student.length; x++){
                              System.out.println((x+1) + " - " +
student[x].displayName());
                        }
                  }
```