education

Department:
Education
PROVINCE OF KWAZULU-NATAL

TRIAL EXAMINATION

SEPTEMBER 2022

INFORMATION TECHNOLOGY P1

Examiner: J.Sewnanen
Moderator: T. Muruvan

MARKS: 150

TIME: 3 hours

This question paper consists of 19 pages.

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INSTRUCTIONS AND INFORMATION

1. This paper is divided into FOUR sections. Candidates must answer ALL FOUR sections.

2. The duration of this examination is three hours. Because of the nature of this examination it is important to note that you will not be permitted to leave the examination room before the end of the examination session.

3. This paper is set in programming terms that are specific to the Delphi programming language.

4. Make sure that you answer the questions according to the specifications that are given in each question. Marks will be awarded according to the set requirements only.

5. Answer only what is asked in each question. For example, if the question does not ask for data validation, then no marks will be awarded for data validation.

6. Your programs must be coded in such a way that they will work with any data and not just the sample data supplied or any data extracts that appear in the question paper.

7. Routines such as search, sort and selection must be developed from first principles. You may not use the built-in features of a programming language for any of these routines.

8. You must save your work regularly on the disk you have been given, or the disk space allocated to you for this examination session.

9. Make sure that your name appears as a comment in every program that you code.

10. If required, print the programming code of all the programs/classes that you completed. You will be given half an hour printing time after the examination session.

11. At the end of this examination session you must hand in a disk/CD/DVD/flash disc with all your work saved on it OR you must make sure that all your work has been saved on the disk space allocated to you for this examination session. Ensure that all files can be read.

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12. The files that you need to complete this question paper have been given to you on a disk/CD/DVD/flash disk or the disk space allocated to you. The files are provided in the form of a password-protected executable file.

NOTE:

- Programmers must use the file **Trial2022Data**.

Do the following:

- Double click on the password-protected executable file.
- Click on the extract button.
- Enter the following password: **TrialP1$2022**

List of files provided in the folder **Trial2022Data** (once extracted):

Delphi files

Question1:	*Question1_p* *Question1_u*
Question2:	*Question2_p* *Question2_u* *ConnectDB_U*
Question3:	*Quest3_P* *BottedWater_U* *bottle_U*
Question4	*Quest4_p* *Quest4_U*

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SCENARIO:
New Lifestyle Mall has numerous shops and services that cater for the people in their community and surrounding areas. Being a modern mall with access to digital devices, software was created for certain businesses.

SECTION A

QUESTION 1: GENERAL PROGRAMMING SKILLS

Do the following:

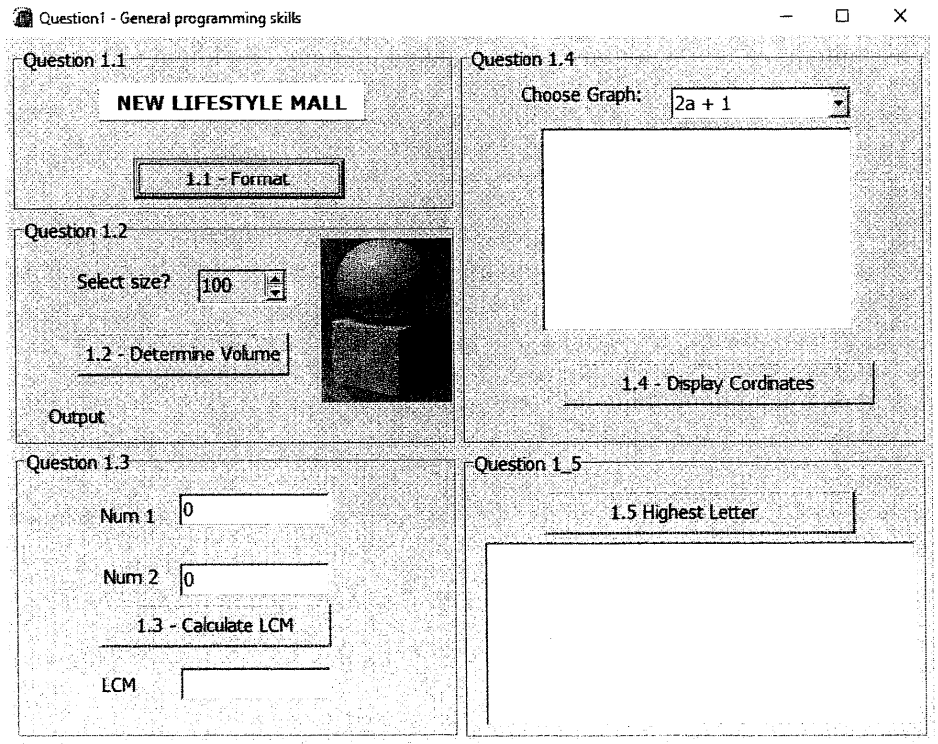
- Open the incomplete program in the Question1 folder.
- Enter your **full name** as a comment in the first line of the program.
- Follow the instructions below to complete the code for each section of Question 1 as described in QUESTION 1.1 to QUESTION 1.5

1.1 Write code for the **btnQ1_1** to:

- Place the image **feature.jpg** which is provided in the Question1 folder in the image component called **imgQ1_1.** The entire picture must fit into the image component
- Display the words '**NEW LIFESTYLE MALL**' on the panel **pnlQ1_1**.
- Set the:
  - Font to Verdana
  - Font to bold

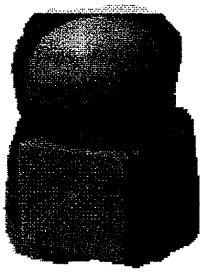
(5)

EXAMPLE OF OUTPUT WHEN THE ABOVE CODE IS EXECUTED



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1.2 The mall managers have decided to place features, as shown in the picture, in strategic points. These features are of different sizes and consists of a sphere placed on a cube.



Volume of Sphere = $\frac{4}{3}\pi r^3$

Volume of cube = $side^3$

Where π =3.14, r = radius of sphere and side= length of 1 side of the cube

NB

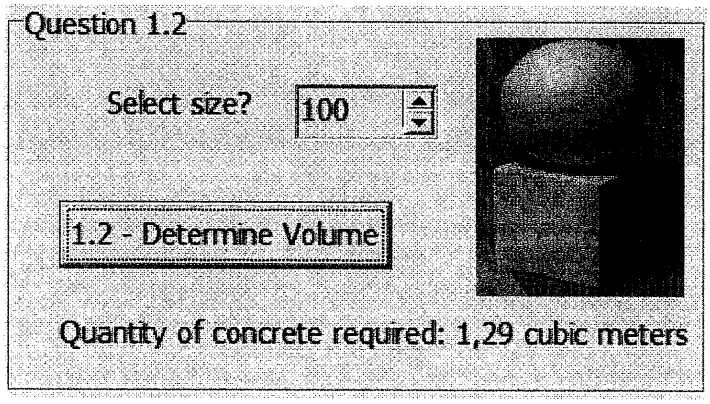
- Code has been provided to read the length of the side of the cube from the provided spin edit component and convert it to metres.
- The sphere has the same diameter as the length of the side of the cube.

Write code for the **btnQuestion1_2** to:

- Create a constant P. Assign a value of 3.14 to P.
- Declare appropriate variables of the correct datatype.
- Determine and output the volume of the feature correct to 2 decimal places in the pnlQ1_2 component.

(8)

Example of output for a cube that has a length of 100cm:



It is coding week and the online computer tuition centre that is in the mall is offering prizes

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to all patrons that can provide code to solve questions 1.3 to 1.5 in a coding challenge.

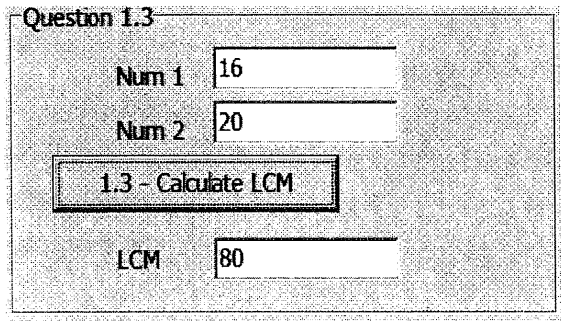
1.3 Determine the LCM (Lowest Common Multiple) of 2 numbers.

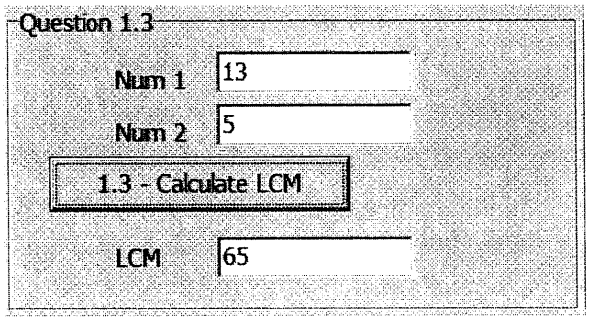
Write code for the **btnQuestion1_3**:

- Read the two integer numbers typed in by the user from **edtQ1_3_1** and the **edtQ1_3_2** edit boxes.
- Determine the LCM of the two numbers.
- Display the LCM in the **edtQ1_3** component.

(8)

Sample Run:

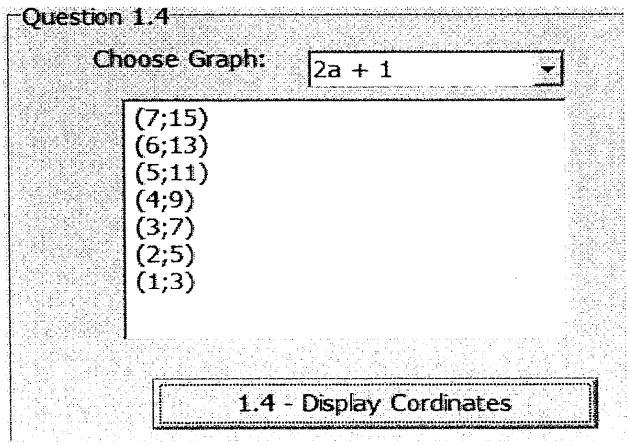




1.4 Various graphs are provided in the **cmbGraph** combobox.

Write code for the **btnQuestion 1_4**:

- Read the selected graph from the **cmbGraph** component.
- Extract appropriate values from the graph and use it to determine the output for different values of 'a'.
- Use a loop to substitute values for 'a' ranging from 7 to 1 and output the calculated values in the co-ordinate form, (a;answer) in the **memQ1_4** component, as indicated in the *sample run* below.



(9)

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1.5 The highest letter in a sentence is the last letter used from the alphabet.

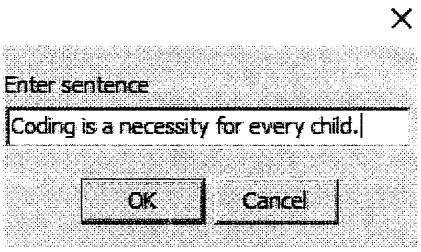
E.g.1. the highest letter in the word 'laugh' is the letter '**u**' since all the other letters appear before the letter 'u' in the alphabet.
E.g.2. the highest letter in the sentence 'Life supporting **W**ater.' is '**w**'

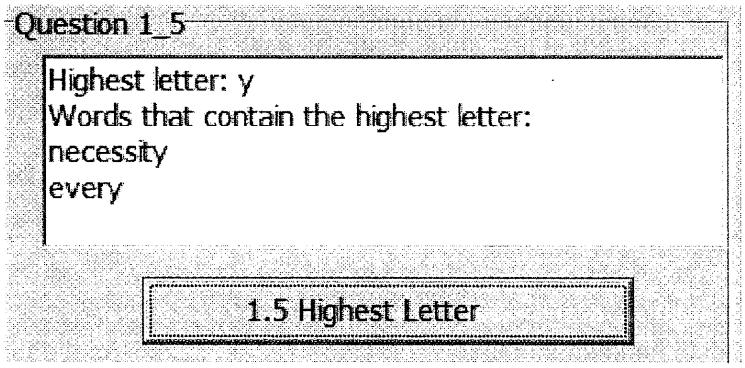
Write code for **btnQ1_5** to:

- Read a sentence using an input box.
- Convert all letters in the sentence to lowercase.
- Determine and output the highest letter in the sentence with an appropriate message in the **redQ1_5** component.
- Determine and output all words in the sentence that contain the highest letter in the **redQ1_5** component.

Sample output:

(10)





TOTAL SECTION A : 40

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SECTION B

QUESTION 2: DATABASE PROGRAMMING

Rental amounts differ for different shops in the mall.
The database **Lifestylemall.mdb** contains details of the shops in **tblShops** and details of rental in **tblRental**. The database consists of two related tables.

Do the following:

- Open the incomplete project file called **Question2_p.dpr** in the **Question 2** folder.
- Enter your name as a comment in the first line of the **Question2_U.pas** unit file.
- Compile and execute the program. The program has no functionality currently. The content of the tables is displayed as shown on the selection of **Tabsheet Question 2.2-Delphi Code.**

- Follow the instructions to complete the code for each section, as described in QUESTION 2.1 and QUESTION 2.2 that follow.
- Use **SQL statements to answer QUESTION 2.1** and **Delphi Code to answer QUESTION 2.2.**

NOTE :

- The 'Restore database' button is provided to restore the data contained in the database to the original content.
- Code is provided to link the GUI components to the database. Do NOT change any of the provided code.
- TWO variables are declared as global variables as described in the table below

Variable	Data Type	Description
tblShops	TADOTable	Refers to the table **tblShops** in the database
tblRental	TADOTable	Refers to the **tblRental** in the database

DATABASE DESIGN

Extract of Design View of the tables

tblShops

Field Name	Data Type
ShopID	Number
StoreName	Short Text
StoreType	Short Text
RiskFactor	Short Text
LeaseRenewalMonth	Number
Keys	Number
Floor	Short Text
ManagerName	Short Text
ManagerGender	Short Text
Contact	Short Text

tblRental

Field Name	Data Type
rentalID	Number
ShopID	Number
month	Date/Time
rentAmount	Currency
paid	Yes/No

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tblShops

ShopID	StoreName	StoreType	RiskFactor	LeaseRenewalMonth	Keys	Floor	ManagerName	ManagerGender	Contact
1	@Home	Home & Décor	Med	5	2	Upper	Strauss, Nadean	Female	0317636315
2	Absolute Pets	Speciality	High	11	4	Upper	Colam, Lara	Female	0317631051
3	Ackermans	Fashion	High	2	4	Upper	Cahn, Jemima	Female	0317631494
4	American Swis	Jewellery & Acces	High	7	2	Upper	Thonger, Ingeborg	Female	0317636313
5	Bargain Books	Books / Stationen	Med	1	3	Lower	Paulot, Delaney	Male	0317631582

Extract of the Data Sheet View of **tblShops**

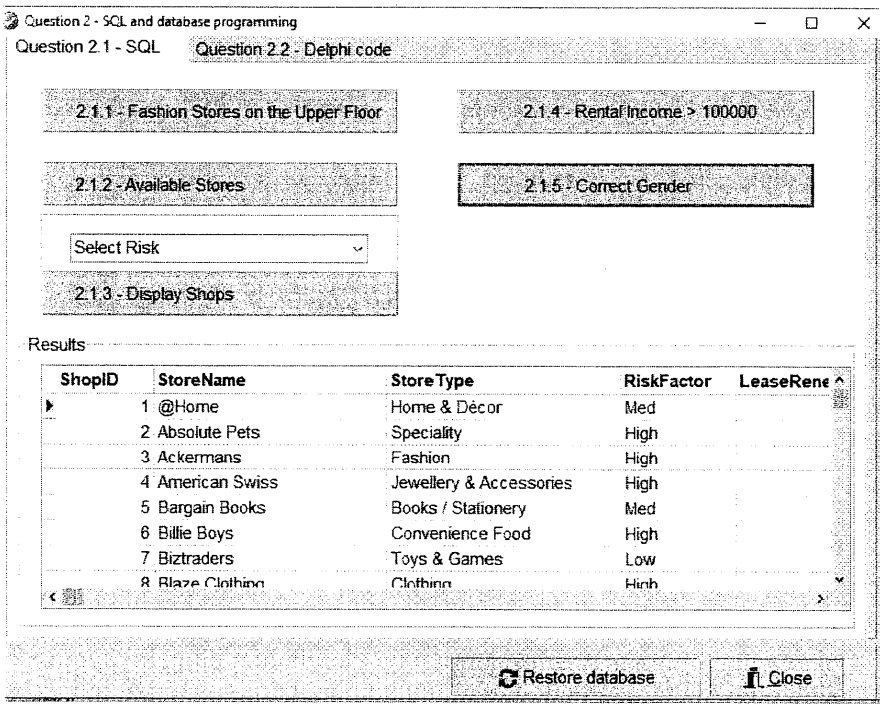
Extract of the Data Sheet View of **tblRental**

tblRental

rentalID	ShopID	month	rentAmount	paid
1	1	2022/06/30	R7 000,00	No
2	2	2022/06/30	R2 400,00	Yes
3	3	2022/06/30	R2 900,00	No
4	4	2022/06/30	R7 700,00	Yes
5	5	2022/06/30	R9 600,00	Yes

2.1 Tab sheet [Question 2.1 – SQL]

Example of the GUI for QUESTION 2.1



NOTE :

- Use **ONLY SQL** statements to answer **QUESTION 2.1.1 to QUESTION 2.1.5**.
- Code is provided to execute the SQL statements and display the results of the queries. The SQL statements assigned to the variables *sSQL* are incomplete !

Complete the SQL statements to perform the tasks described in QUESTION 2.1.1 to QUESTION 2.1.5 that follow.

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2.1.1 Button [2.1.1 – Fashion Stores on the Upper Floor]
Display **Store Names** of **fashion** stores on the **Upper** floor. (4)

SAMPLE OUTPUT

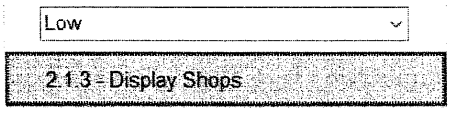
StoreName
Ackermans
Cotton On
Foschini
Fox Outlet
Holmes Brothers
JET
Markham
Miladys

2.1.2 Button[2.1.2 – Available Stores]
Display the different types of stores available in the mall. The store type must only appear once in the output list. (2)
SAMPLE OUTPUT

StoreType
Banks & Bureau De Change
Books / Stationery
Cell Phones & Cell Phone
Clothing
Computer, Electronics & A
Convenience Food
Curios, Gifts & Novelties
Department Stores

2.1.3 Button [2.1.3 – Display Shops]
Code has been provided to read the risk level from the combobox **cmbQ2_1_3**

Display the **Store Name**, **Store Type** and **Floor** of all shops that are of the selected risk level (5)
SAMPLE OUTPUT



Results

StoreName	StoreType	Floor
Crazy store	Curios, Gifts & Novelties	Upper
Fox Outlet	Fashion	Upper
Holmes Brothers	Fashion	Upper
JET	Fashion	Upper
Miladys	Fashion	Upper
Mr Price Sport	Sportwear & Outdoor	Upper
Perfect 10	Health & Beauty	Upper
Plush Car Wash	Services	Upper

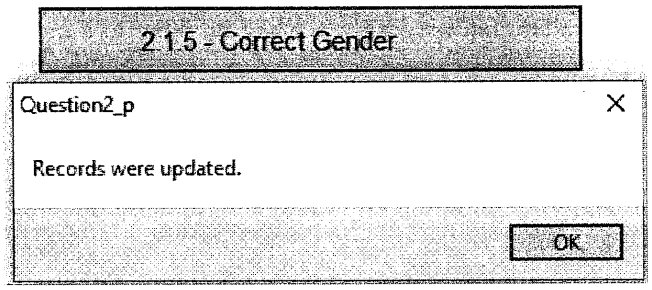
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2.1.4 **Button [2.1.4 – Rental Income > 100000]**
Display the **StoreType**, **Sum of the rental received** formatted as currency as Total Rental of the different StoreTypes with total rental greater than 100000 (8)

SAMPLE OUTPUT

StoreType	Total Rental
Cell Phones & Cell Phone	R108 800,00
Fashion	R275 500,00
Health & Beauty	R156 700,00
Restaurants & Fast Food	R120 700,00

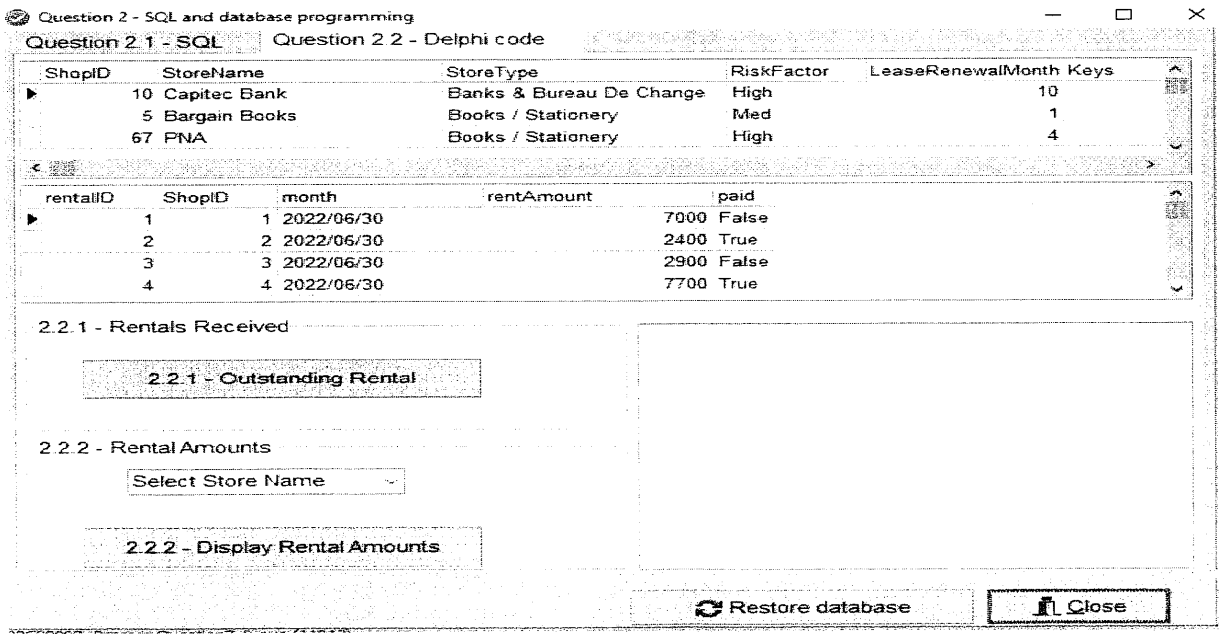
2.1.5 **Button [2.1.4 – Correct Gender]**
All **Managers** whose **Gender** is captured as **'Polygender'** or **'Bigender'** must be changed to **'Male'**



(4)

2.2 Tab sheet [Question 2.2 – Delphi Code]

Example of GUI for Question 2.2



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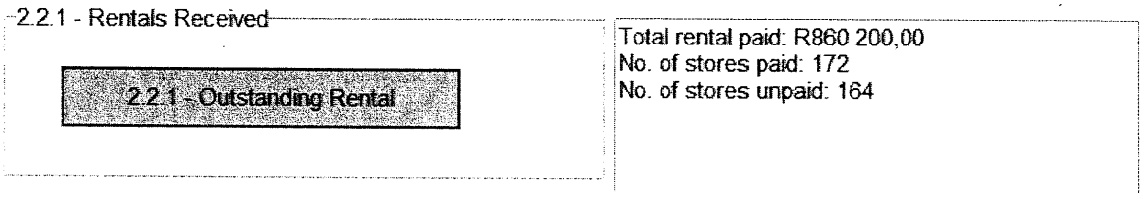
NOTE

- Use ONLY Delphi Code to answer QUESTION 2.2.1 to QUESTION 2.2.2
- NO marks will be awarded for SQL statements in Question 2.2.

2.2.1 **Button [2.2.1 – Outstanding Rental]**

Write code that uses **tblRental** to determine and output the **Total Rental** Received, the number of shops that **paid rental** and the number of shops that have **not paid rentals**.

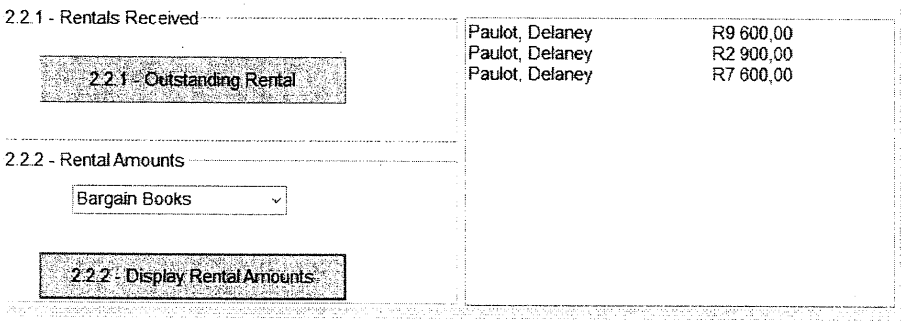
SAMPLE OUTPUT



(8)

2.2.2 **Button [2.2.2- Display Rental Amounts]**

Code to read the store name from the given combo-box: **cmbQ2_2_2** is provided Determine and display the store **ManagerName** and the **rentAmount** received for his stores.



(9)

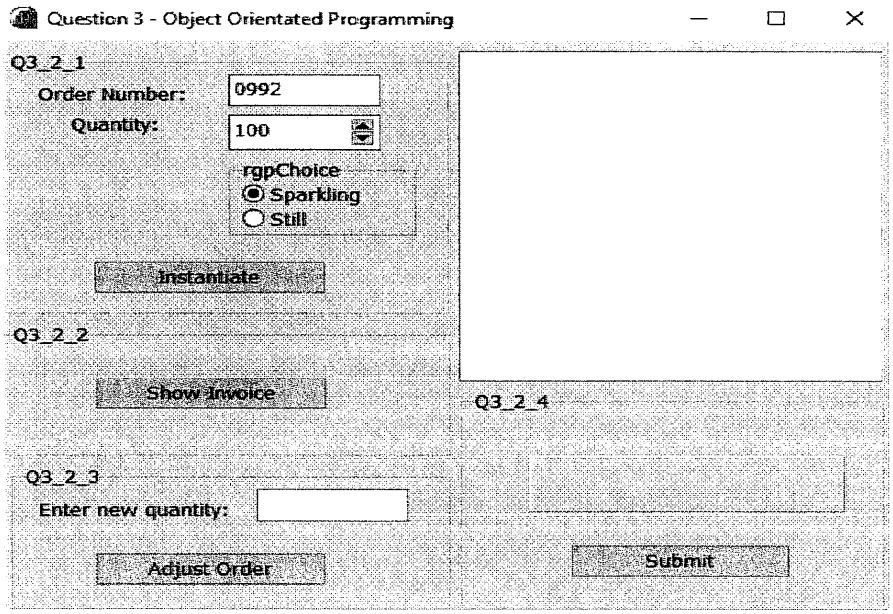
TOTAL SECTION B: **40**

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SECTION C
QUESTION 3: OBJECT- ORIENTATED PROGRAMMING

Access to clean water is becoming a problem in most communities. The provided app was created for a shop that is in the New Lifestyle Mall that supplies water in 500ml bottles to clients.

Open the project (**Quest3.dproj**) in the **Question 3** folder. Also open the Unit (**bottle_U**). When you compile and run the program the following GUI appears.



3.1 The unit **bottle_U** has been created and contains declarations for the following private fields:

Field Name	Data Type	Description
fOrdernum	String	Order number
fType	String	'sparkling' or 'still'
fQuantity	Integer	Number of 500ml bottles
fDiscount	Real	Discount %

Code for the accessor methods: **getType, getDiscount** and **getQuantity** is provided.

3.1.1 Write code for **constructor create** that will receive the Ordernumber, Type and Quantity as parameters. Assign the parameters to the correct private fields. Set the Discount value to 0. **(4)**

3.1.2 Write code for a mutator method **setOrderNum** that will receive a new order number as a parameter and assign the order number to the relevant attribute **(2)**

3.1.3 Write code for the method **calcCases** that calculates and returns the number of cases of water according to the following critera:

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- use the number of bottles ordered (quantity) to determine the number of cases.
- Still water has 24 bottles per case whilst sparkling water has 12 bottles per case.
- Clients are supplied with full cases only. E.g. If a client orders 25 bottles of sparkling water he will have to buy 3 cases. (3 cases of 12 bottles per case). **(5)**

3.1.4 Provide code for the method **CalcDiscount** that will calculate the discount percent per order in the following manner:

Quantity	**Discount Amount**
<500 bottles	0% of sale amount
500 to 999	2% of sale amount
1000 to 1499	4% of sale amount
1500 to 1999	6% of sale amount
>= 2000	8% of sale amount

Assign the discount to the **fDiscount** attribute. **(4)**

3.1.5 Still water costs R 89.99 per case whilst sparkling water costs R 59.99 per case. Provide code for the **determineAmount** method that will calculate and return the total owing after discount. **(4)**

3.1.6 Write code for a method called **UpDateQuantity** that receives an integer parameter value. The parameter is the difference (positive or negative) that must be added or subtracted from the **quantity** attribute. **(4)**

3.1.7 Write code for a **toString** method that will return all details of the sale as indicated below:

```
OrderNo: 0992
Type: SPARKLING
Quantity: 1450 bottles
Charge for: 121 cases
Discount: 4 %
Total: R6 968,44
```

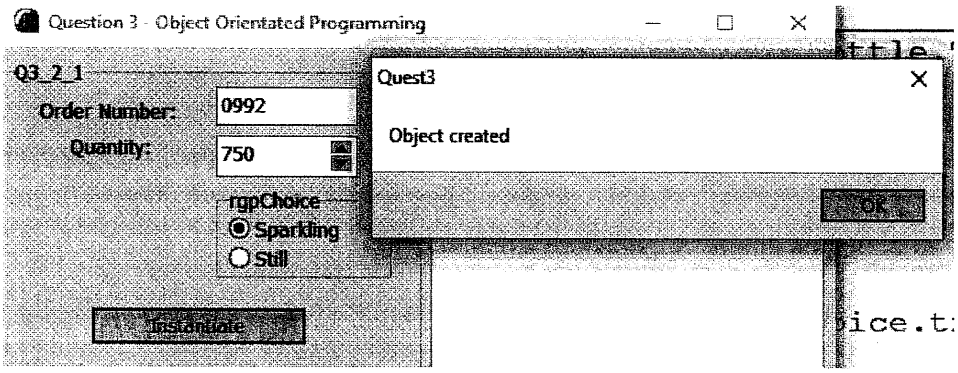
(3)

3.2 In the **BottledWater_U** Unit:

bottle_U has been declared in the uses section and an object **objBottle** has been created.

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3.2.1 Write code for **btnInstantiate** that will read the ordernumber from the edit box, the quantity from the spin-edit and type from the radio-group. Instantiate an **objBottle** object. Display a message saying 'object created'.



(4)

3.2.2 Write code for **btnShow** that calls on the relevant method to display an invoice in the redQ3_2 component as indicated below:

OrderNo: 0992
Type: SPARKLING
Quantity: 100 bottles
Charge for: 9 cases
Discount: 0 %
Total: R539,91

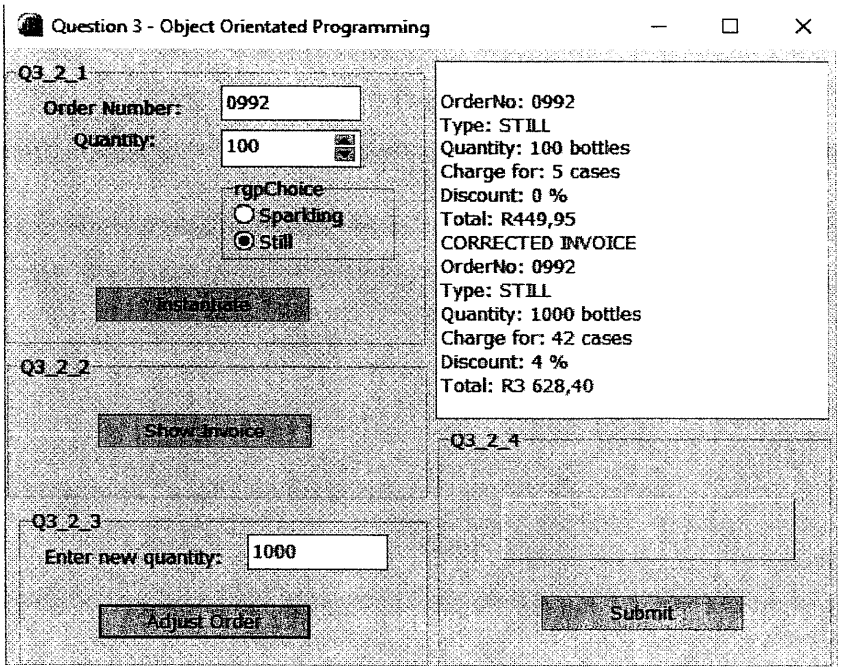
(2)

3.2.3 Write code for **btnAdjust** that will:

- Read the new quantity from the **edtNewQuantity** edit box.
- Determine the difference between the new quantity and the quantity in the existing order.

- Update the quantity in the object class by calling on the **AdjustQuantity** method.
- Display the Corrected invoice in the **red3_2** component.

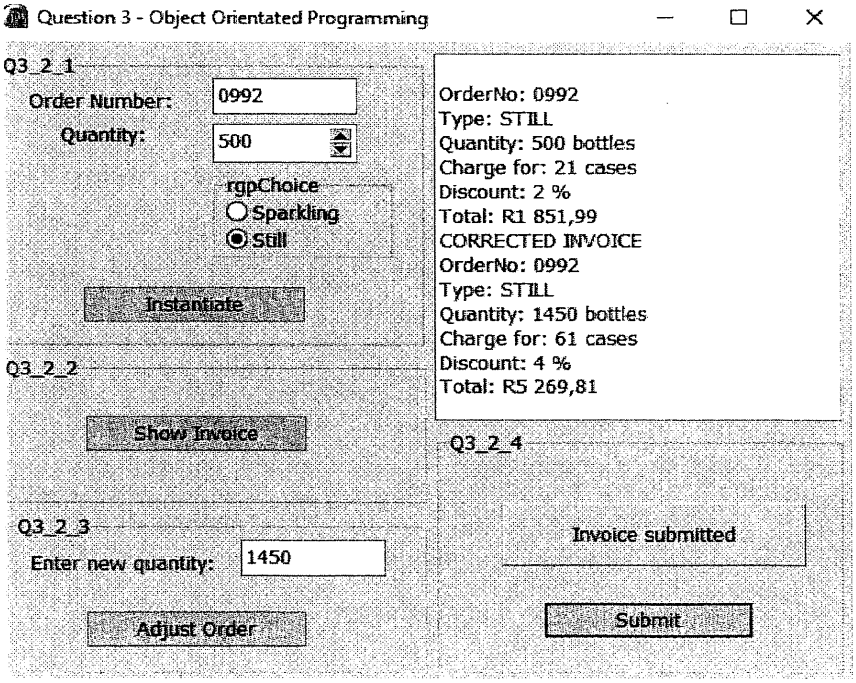
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(5)

3.2.4 Write code for **btnSubmit** that will:

- Write the invoice to a new file called **'Invoice.txt'**
- Display the message 'Invoice submitted' in pnlMessage.



(5)

TOTAL SECTION C: 42

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SECTION D

QUESTION 4: PROBLEM SOLVING

New Lifestyle Mall has 3 floors (Levels) with 4 entrances on each level. Security guards are placed on duty at each of the 12 entrances.

Open the **Mall_U.dProj** Delphi project in the **Question 4** folder. An incomplete Delphi program has been provided.

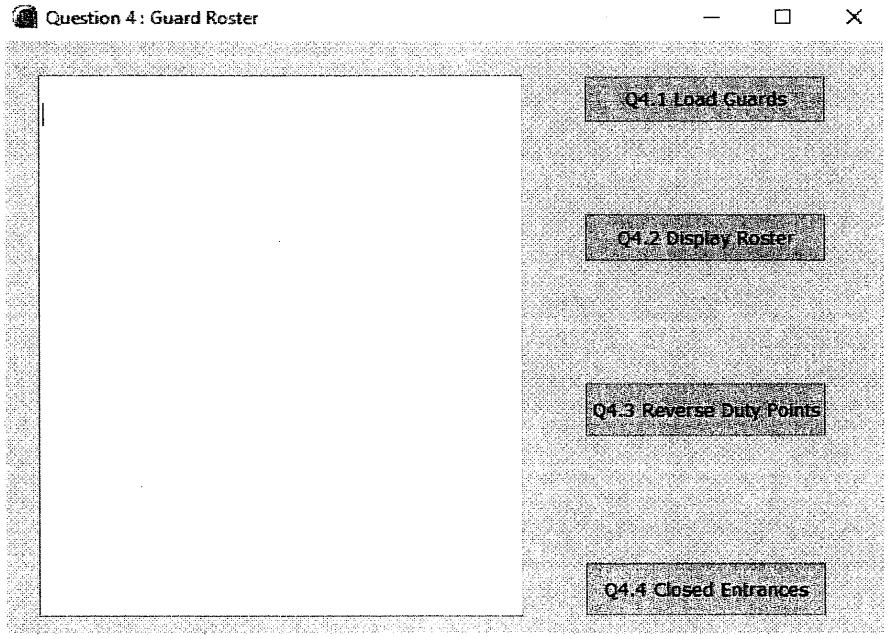
The following variable declarations have also been provided:
arrNames: array [1 .. 12] of string = ('Simon', 'Lungi', 'Chris', 'Gary', 'Thomas', 'Carol',
'Moses', 'Mbali', 'Wilson', 'Nick', 'Berry', 'Blade');

arrEntrances: array [1 .. 3, 1 .. 4] of String;

arrNames contains the names of 12 guards.

The columns for the two-dimensional array **arrEntrances** shows each of the 4 entrances and the rows represent each of the 3 levels.

The buttons on the GUI that has been created has no functionality.

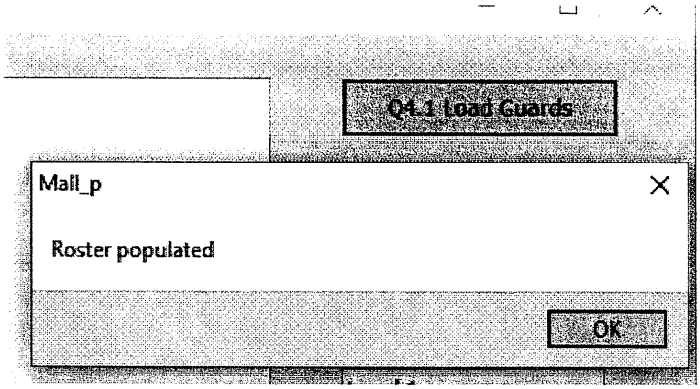


4.1 Q4_1_btnLoadGuards

- Populate arrEntrances with the names of the guards from arrNames. (The first 4 guards are on duty on level 2, the next 4 guards are on duty on level 1 and the last 4 guards are on duty on level 0.)
- Display the message 'guards loaded' once the array is populated.

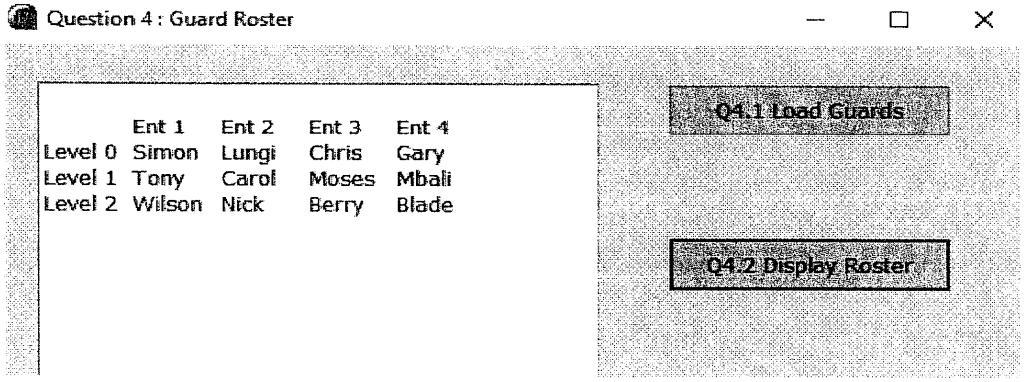
(7)

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4.2 Q4_2_btnDisplayRoster

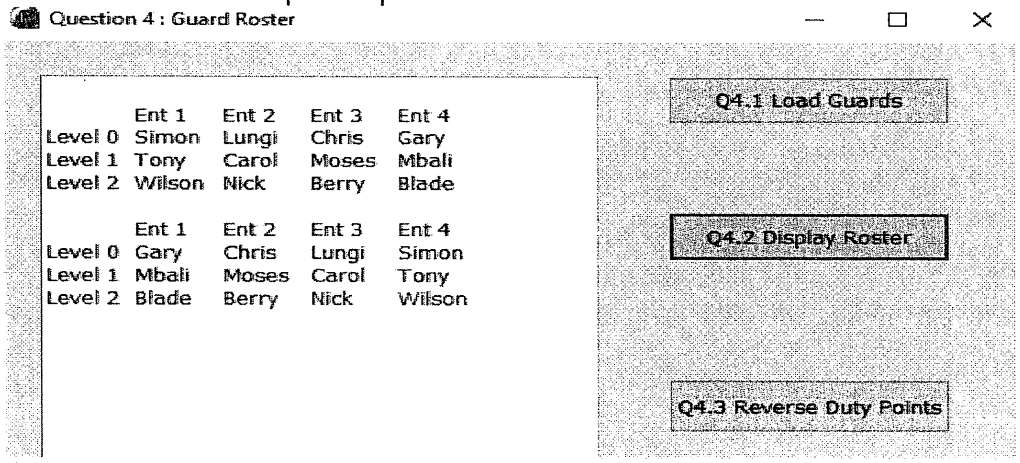
Display a roster of the guards on duty at each of the entrances on each level of the mall as shown in the sample run below:



(6)

4.3 Q4_3_btnReverse

Write code to reverse the duty points of each of the guards on each level as indicated in the sample output below:



(8)

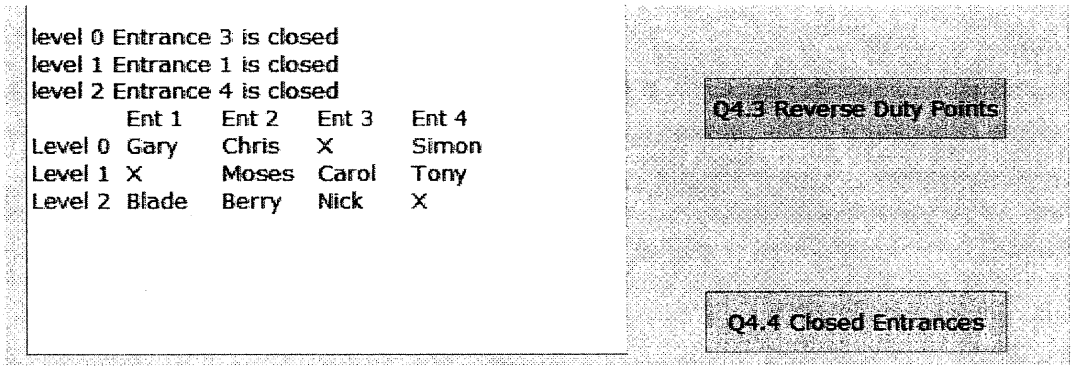
4.4 Q4_4_btnLeave

To be fair to all shop owners, a random entrance is closed on 3 days of the week to allow the guards to take leave.

Write code to randomly close an entrance on each of the levels. Indicate the closed entrance with an X in the two-d array, **arrEntrances**.
Display the entrances that closed on each level as shown below:

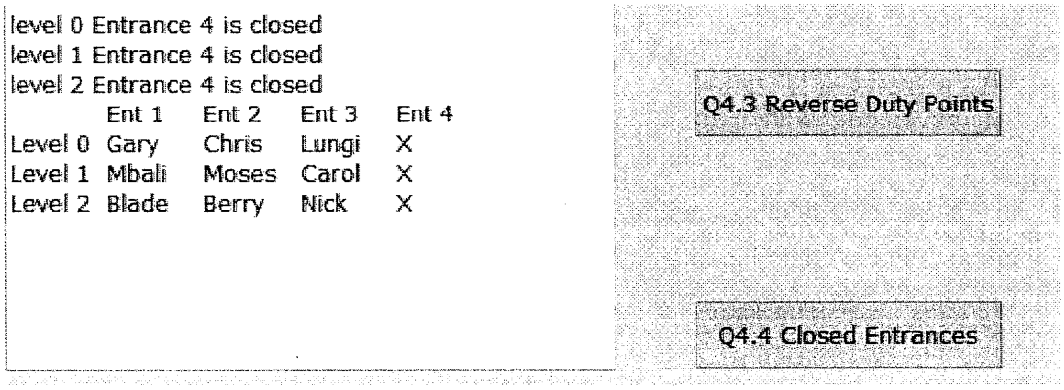
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Sample Output 1:



Sample Output 2:

(7)



TOTAL SECTION D : 28

TOTAL = 150

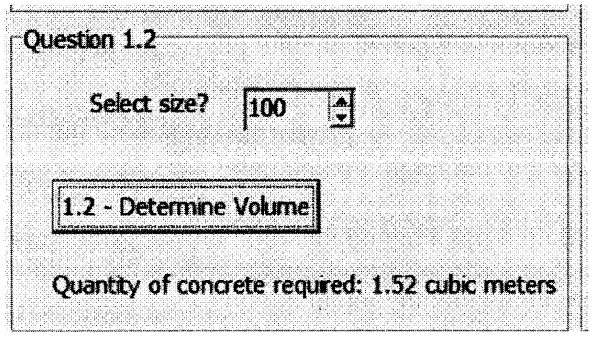
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Pinetown IT Paper 1 – Errata

1.2. bullet number 5 should read

- Determine and output the volume of the feature correct to 2 decimal places in the **lblQ1_2** component.

Also Sample output for Volume



4.2. Sample output should be as follows as per the specification given in 4.1.

