# INFORMATION TECHNOLOGY P1

# FEBRUARY/MARCH 2017

# MEMORANDUM

# NATIONAL

# SENIOR CERTIFICATE

# GRADE12

**MARKS: 150**

**This memorandum consists of 29 pages.**

|  |  |  |
| --- | --- | --- |
| **GENERAL INFORMATION:** |  |  |
|  |  |  |
| * These marking guidelines are to be used as the basis for the marking session. They were prepared for use by markers. All markers are required to attend a rigorous standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' work.
 |  |  |
|  |  |  |
| * Note that learners who provide an alternate correct solution to that given as example of a solution in the marking guidelines will be given full credit for the relevant solution, unless the specific instructions in the paper were not followed or the requirements of the question were not met.
 |  |  |
|  |  |  |
| * **Annexures A, B and C** (pages 3–9) include the marking grid for each question for using either one of the two programming languages.
 |  |  |
|  |  |  |
| * **Annexures D, E and F** (pages 10–17) contain examples of solutions for Java for QUESTION 1 to QUESTION 3 in programming code.
 |  |  |
|  |  |  |
| * **Annexures G, H and I** (pages 18–29) contain examples of solutions for Delphi for QUESTION 1 to QUESTION 3 in programming code.
 |  |  |
|  |  |  |
| * Copies of **Annexures A, B and C** (pages 3-9) should be made for each learner and completed during the marking session.
 |  |  |

**ANNEXURE A:**

**SECTION A:**

**QUESTION 1: MARKING GRID- GENERAL PROGRAMMING SKILLS**

|  |  |
| --- | --- |
| CENTRE NUMBER:  | EXAMINATION NUMBER:  |
| QUESTION | **DESCRIPTION** | MAX. MARKS | LEARNER'S MARKS |
|  | ***A learner must be penalised only once if the same error is repeated.*** |  |  |
| 1.1 | **Button - [Question 1\_1]**Extract name and surname from textbox✓Check if space is included in name surname string✓If no space included✓ Display message indicating no space included ✓Extract ID number✓If ID number textbox is empty✓ Display message indicating the textbox is empty✓If ID number string does not consist of 13 digits✓ Display message indicating 13 digits was not entered✓If nameSurname string includes a space✓ AND ID number is not empty✓ AND ID number has 13 digits ✓  (Both conditions tested with AND)✓ Set Welcome message to visible✓ | **14** |  |
| 1.2  | **Buttons with Icons showing type of Loyalty card****Button Discount:** Set global value to DI ✓ Change Discount heading to bold ✓ and Charity heading to not bold ✓**Button Charity:** Set global value to CH ✓ Change Charity heading to bold ✓ and Discount heading to not bold ✓ | **6** |  |

|  |  |  |  |
| --- | --- | --- | --- |
| 1.3 | **Button - [Question 1\_3]**Extract purchase amount from text box ✓and convert to real value ✓Use type of card code to test (Case/Switch or If): If 'DI' ✓ Calculate discount at 1.5% ✓ of amount ✓ Compile message ✓ amount displayed as currency ✓ with 2 decimal places ✓ If 'CH' ✓ Calculate number of R100's✓ \* 3 ✓ Making provision for part of R100 ✓ Compile message ✓including the amount✓Display message in text box ✓ | **15** |  |
| 1.4 | **Button - [Question 1\_4]****Part 1:**Assign a default character P to variable ✓If Business card checked ✓ then assign B to variable ✓Extract first 3 digits from ID number ✓and add to content of variable ✓**Part 2:**Extract the last digit of the ID number ✓✓Convert to integer ✓Find the character at the integer position in given string ✓ Join the character to digit ✓Display compiles strings in text boxes: Part 1 ✓ Part 2 ✓ Part 3 (DI/CH) ✓ | **13** |  |
|  | **TOTAL:** | **48** |  |

**ANNEXURE B:**

**SECTION B**

**QUESTION 2: MARKING GRID - OBJECT-ORIENTED PROGRAMMING**

|  |  |
| --- | --- |
| CENTRE NUMBER:  | EXAMINATION NUMBER:  |
| QUESTION | **DESCRIPTION** | MAX. MARKS | LEARNER'S MARKS |
| 2.1.1 | **Constructor:**Definition with three correct parameters ✓ and correct data types✓Assign parameter values to card number, cellphone number and loyalty points ✓Initialise number of visits to 0 ✓Initialise healthLevel attribute to S ✓ | **5** |  |
| 2.1.2 | **Mutator method:**setNumVisits method with parameter✓ no return ✓ | **2** |  |
| 2.1.3 | **increaseLoyaltyPoints method:**Method definition receiving total amount as parameter as real value✓Determine loyalty points earned:Change total to integer (without rounding ✓ – full rands) ✓ Divide by 4✓Add calculated points to loyalty points attribute✓ ✓ | **5** |  |
| 2.1.4 | **updateHealthLevelmethod:**Method definition receiving health amount and total amount as parameters✓Calculate percentage ✓If percentage is less than 10✓ Assign 'S' to healthLevel-attribute ✓ Aa A If percentage is 10 or more and less than 40✓ Assign 'G' to healthLevel-attribute ✓If percentage is 40 or more Assign 'P'' to healthLevel-attribute ✓ | **7** |  |

|  |  |  |  |
| --- | --- | --- | --- |
| 2.1.5 | **isCorrect method: (Method definition provided)**Loop through the digits in the ID number ✓  remove the 0 digits ✓ from the stringInitialise variable for sum✓If even number of digits left in string ✓ Loop correct number of times ✓ Add values with 2 digits to sum variable from left hand side of string ✓If odd number of digits left in string ✓ Add first left hand side digit from string as a one digit value to sum✓ Loop correct number of times ✓ Add two-digits values to sum variable ✓If sum is equal to access code parameter ✓ return true✓else  return false✓ | **13** |  |
| 2.1.6 | **identifyStarShopper method:**Empty string variable - if not Star shopper ✓If (loyalty points > 2000✓ AND number of visits > 10)✓ OR✓ (healthLevel is 'P') ✓ Set variable to string 'STAR shopper'✓Return string variable | **6** |  |

**QUESTION 2: MARKING GRID – continued**

|  |  |  |  |
| --- | --- | --- | --- |
| 2.2.1 | **Button – [2.2.1 – Check access code]**Extract the card number from the combo box✓Extract cellphone number from label ✓Extract access code from text box ✓Extract loyalty points from label and convert to integer✓Instantiate object ✓  sending correct arguments in correct order✓ (6)**If access code is correct**Test if access code is correct ✓ using isCorrect method ✓ **Read text file and process data** {*Delphi: AssignFile, Reset and CloseFile* *Java: Create object to read from file*} ✓ Initialise variables for counters and sum ✓Loop through file ✓ Read card number ✓ Read total amount spent and convert to double data type ✓ Read health amount spent and convert to double ✓ Test if it is correct card number ✓ Add total amount to sumTotal ✓ Add health amount to sumHealth ✓ Increment counter ✓ Call setVisits method ✓ Call increaseLoyaltyPoints method – send sumTotal as argument ✓  Call updateHealthLevel method –  send sumTotal and sumHealth as arguments ✓end loopEnable button for Q2.2.2 ✓**If access code is NOT correct**Display message indicating that access code was incorrect ✓Clear the access code text box ✓ (18) | **24** |  |
| 2.2.2 | **Button – [2.2.2 - Display card holder details]**Display object details using toString ✓ in the output area ✓Display shopper status using identifyStarShopper method ✓ | **3** |  |
|  | **TOTAL:** | **65** |  |

**ANNEXURE C:**

**SECTION C**

**QUESTION 3: MARKING GRID – PROBLEM SOLVING**

|  |  |
| --- | --- |
| CENTRE NUMBER:  | EXAMINATION NUMBER:  |
| QUESTION | **DESCRIPTION** | **MAX. MARKS** | **LEARNER'S MARKS** |
| 3.1 | **Button [3.1 – Display layout]**Outer loop for rows ✓ Inner loop for columns ✓ Display symbol from two dimensional array ✓  In row ✓ and in column ✓ | **5** |  |
| 3.2 | **Combo box – Select Restaurants**Extract shop as character from combo box ✓Initialise variables for position (row and column ✓)Loop through the rows ✓ If the shop is within characters A-E (to the left)✓ Set col for shop to 0 (first column) ✓ Set col for friend to 1 (second column) ✓ If the shop is within characters F-J (to the right) ✓ Set col for shop to last col of arrMall ✓ Set col for friend to one less than col for shop ✓ Test if character at current position in array ✓ equals selected shop's character ✓ Replace X with # ✓ Update display ✓End loop | **13** |  |
| 3.3 | **Button [3.3 - Locate nearest friend(s)]**Initialise nearest distance to a large value✓Outer loop for rows ✓ Inner loop for columns/if for right hand side ✓ If character at position is # ✓Determine difference in row positions ✓ as positive value ✓ Determine difference in column positions✓ as positive value ✓ Calculate newDistance ✓If friend is in A-E or display shop name ✓  If friend is in F-J ✓ display shop name ✓  If newDistance < = nearest distance ✓ Add shop name to output message ✓ Replace nearest with newDistance ✓  Displayshop name ✓ and distance \* 4.5 ✓Display output message indicating nearest friends ✓ | **19** |  |
|  | **TOTAL:** | **37** |  |

**SUMMARY OF LEARNER'S MARKS:**

|  |  |
| --- | --- |
| CENTRE NUMBER:  | EXAMINATION NUMBER:  |
|  | **SECTION A** | **SECTION B** | **SECTION C** |  |
|  | **QUESTION 1** | **QUESTION 2** | **QUESTION 3** | **GRAND TOTAL** |
| **Max. Marks** | **48** | **65** | **37** | **150** |
| **LEARNER'S MARKS** |  |  |  |  |

**ANNEXURE D: SOLUTION FOR QUESTION 1: JAVA**

// Code provided

 String typeCard = "";

 String characters = "!@#$%]&\*^~";

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 1.1

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

private void btnQ1\_1ActionPerformed(java.awt.event.ActionEvent evt)

{

 String nameSurname = txfNameSurname.getText();

 String idNum = txfIDNumber.getText();

 boolean nSpace = nameSurname.contains(" ");

 boolean noId = idNum.length() == 0;

 boolean idLen = idNum.length() != 13;

 if (!nSpace) {

 JOptionPane.showMessageDialog(rootPane, "The name-surname field

 does not contain a space.");

 }

 if (noId) {

 JOptionPane.showMessageDialog(rootPane, "An ID number must be

 entered.");

 }

 else

 if (idLen) {

 JOptionPane.showMessageDialog(rootPane, "The ID number does not

 consist of 13 digits.");

 }

 if (nSpace && !idLen && !noId) {

 lblWelcomeMessage.setVisible(true);

 }}

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 1.2

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

private void btn1\_2DiscountActionPerformed

(java.awt.event.ActionEvent evt)

{

 typeCard = "DI";

 lblDiscount.setFont(new java.awt.Font("Tahoma", 1, 12));

 lblCharity.setFont(new java.awt.Font("Tahoma", 0, 12));

 }

 private void btn1\_2CharityActionPerformed

(java.awt.event.ActionEvent evt) {

 typeCard = "CH";

 lblCharity.setFont(new java.awt.Font("Tahoma", 1, 12));

 lblDiscount.setFont(new java.awt.Font("Tahoma", 0, 12));

 }

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 1.3

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

private void btnQ1\_3ActionPerformed(java.awt.event.ActionEvent evt) {

 double amount = Double.parseDouble(txfAmount.getText());

 String message = "";

 switch (typeCard) {

 case "DI":

 double discount = amount \* 0.015;

 message = "1.5% discount on your purchase amount is " +

 String.format("R %.2f", discount) + ".";

 break;

 case "CH":

 double contribution = Math.ceil(amount / 100.0) \* 3;

 message = "An amount of " + String.format("R %.2f",

 contribution) + " will be donated to charity.";

 break;

 }

 txfQ1\_3.setText(message); }

}

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 1.4

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

private void btnQ1\_4ActionPerformed(java.awt.event.ActionEvent evt) {

 String bCard = "P";

 if (chkBusiness.isSelected()) {

 bCard = "B";

 }

 String part1 = bCard + txfIDNumber.getText().substring(0,3);

 char digit = txfIDNumber.getText().charAt(12);

 int pos = Integer.parseInt(digit + "");

 String part2 = digit + "" + characters.charAt(pos) + "";

 txfCode1.setText(part1 + "");

 txfCode2.setText(part2 + "");

 txfCode3.setText(typeCard);

}

**ANNEXURE E: SOLUTION FOR QUESTION 2: JAVA**

**SOLUTION FOR QUESTION 2: OBJECT CLASS**

package Question2Package;

public class CardHolder{

 // Code provided

 private String cardNumber;

 private String cellNumber;

 private int numVisits;

 private int loyaltyPoints;

 private char healthLevel;

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

//Question 2.1.1

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

public CardHolder(String cardNumber, String cellNumber, int loyaltyPoints)

{

this.cardNumber = cardNumber;

this.cellNumber = cellNumber;

this.loyaltyPoints = loyaltyPoints;

this.numVisits = 0;

this.healthLevel = 'S';

}

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

//Question 2.1.2

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

public void setNumVisits(int numVisits) {

 this.numVisits = numVisits;

 }

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

//Question 2.1.3

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

public void increaseLoyaltyPoints(double total) {

 loyaltyPoints = loyaltyPoints + (int) total / 4;

 }

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

//Question 2.1.4

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

public void updateHealthLevel(double sumHealth, double sumTotal) {

 double perc = sumHealth / sumTotal \* 100;

 healthLevel = 'S';

 if (perc >= 10 && perc < 40) {

 healthLevel = 'G';

 }

 if (perc >= 40) {

 healthLevel = 'P';

 }

 }

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

//Question 2.1.5

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

public boolean isCorrect(int accessNum) { //given

 String cNum = "";

 for (int cnt = 0; cnt < cellNumber.length(); cnt++) {

 if (cellNumber.charAt(cnt) != '0')

 {

 cNum = cNum + cellNumber.charAt(cnt);

 }

 }

 int sum = 0;

 if (cNum.length() % 2 == 0) {

 for (int cnt = 0; cnt < cNum.length(); cnt = cnt + 2) {

 sum = sum + Integer.parseInt(cNum.substring(cnt, cnt + 2));

 }

 } else {

 sum = Integer.parseInt(cNum.substring(0, 1)); //1

 for (int cnt = 1; cnt < cNum.length(); cnt = cnt + 2) { //1

 sum = sum + Integer.parseInt(cNum.substring(cnt, cnt + 2));

 }

 }

 if (sum==accessNum) {

 return true;

 } else {

 return false;

 }

 }

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

//Question 2.1.6

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

public String identifyStarShopper() {

 String star = "";

 if ((loyaltyPoints > 2000 && numVisits > 10)||(healthLevel == 'P')) {

 star = "STAR shopper";

 }

 return star;

}

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Code provided

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 public String toString() {

 return cardNumber + "\nContact number: " + cellNumber +

"\n\nUpdated number of loyalty points: " + loyaltyPoints +

"\nNumber of visits: " + numVisits + "\nHealth evaluation status: " + healthLevel;

 }

}

**GUI CLASS: QUESTION2\_SOLUTION**

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Code provided

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 CardHolder objCardHolder = null;

 public Question2\_Memo() {

 initComponents();

 setLocationRelativeTo(this);

 btnQues222.setEnabled(false);

 }

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

//Question 2.2.1

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

private void btnQ221ActionPerformed(java.awt.event.ActionEvent evt) {

 String cardNum = "" + cmbCardNumbers.getSelectedItem();

 String cellNum = lblCellNumber.getText();

 int accessNum = Integer.parseInt(txfCode.getText());

 int currPoints = Integer.parseInt(lblLoyaltyPoints.getText());

 objCardHolder = new CardHolder(cardNum, cellNum, currPoints);

 if (objCardHolder.isCorrect(accessNum)) {

 JOptionPane.showMessageDialog(rootPane, "The access code is

 correct.");

 try {

 Scanner scFile = new Scanner(new

FileReader("DataJanuary2017.txt"));

 double sumTotal = 0;

 double sumHealth = 0;

 int cnt = 0;

 while (scFile.hasNext()) {

 String card = scFile.nextLine();

 double totalAmount =

Double.parseDouble(scFile.nextLine());

 double healthAmount =

Double.parseDouble(scFile.nextLine());

 if (card.equalsIgnoreCase(cardNum)) {

 sumTotal = sumTotal + totalAmount;

 sumHealth = sumHealth + healthAmount;

 cnt++;

 } // if

 } // while

 objCardHolder.setNumVisits(cnt);

 objCardHolder.increaseLoyaltyPoints(sumTotal);

 objCardHolder.updateHealthLevel(sumHealth, sumTotal);

 } catch (FileNotFoundException e) {

 JOptionPane.showMessageDialog(rootPane, e);

 }

 btnQ222.setEnabled(true);

 } else {

 JOptionPane.showMessageDialog(rootPane, "Incorrect access

 code.");

 txfCode.setText("");

 }

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

//Question 2.2.2

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

private void btnQues222ActionPerformed(java.awt.event.ActionEvent evt)

{

 txaOutput.setText(objCardHolder.toString());

 txaOutput.append("\n" + objCardHolder.identifyStarShopper()); }

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Code provided

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

public void updatePoints() {

 if (cmbCardNumbers.getSelectedIndex() == 0) {

 lblLoyaltyPoints.setText("2130");

 lblCellNumber.setText("0812345678");

 }

 if (cmbCardNumbers.getSelectedIndex() == 1) {

 lblLoyaltyPoints.setText("5723");

 lblCellNumber.setText("0822001100");

 }

 if (cmbCardNumbers.getSelectedIndex() == 2) {

 lblLoyaltyPoints.setText("12908");

 lblCellNumber.setText("0740998877");

 }

 if (cmbCardNumbers.getSelectedIndex() == 3) {

 lblLoyaltyPoints.setText("500");

 lblCellNumber.setText("0720951083");

 }

 txaOutput.setText("");

 txfCode.setText("");

 btnQ222.setEnabled(false);

 }

**ANNEXURE F: SOLUTION FOR QUESTION 3: JAVA**

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Code provided

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

char[][] arrMall = {{'A', 'X', 'O', '\*', 'O', 'X', 'J'}, {'B', 'X', 'O', 'O', 'O', 'X', 'I'}, {'C', 'X', 'O', 'O', 'O', 'X', 'H'}, {'D', 'X', 'O', 'O', 'O', 'X', 'G'}, {'E', 'X', 'O', 'O', 'O', 'X', 'F'}};

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 3.1

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

private void btnDisplayActionPerformed(java.awt.event.ActionEvent evt) {

 txaQ31.setText("\n");

 for (int r = 0; r < arrMall.length; r++) {

 for (int c = 0; c < arrMall[0].length; c++) {

 txaQ31.append(String.format("%5s", arrMall[r][c]));

 }

 txaQ31.append("\n");

 }

 }

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 3.2

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 private void cmbShopsActionPerformed(java.awt.event.ActionEvent evt) {

 char shop = ((String) cmbShops.getSelectedItem()).charAt(0);

 int colShop = 0;

 int colFriend = 0;

 for (int r = 0; r < arrMall.length; r++) {

 if (shop >= 'A' && shop <= 'E') {

 colShop = 0;

 colFriend = 1;

 } else {

 colShop = arrMall[0].length - 1;

 colFriend = colShop - 1;

 }

 if (arrMall[r][colShop] == shop) {

 arrMall[r][colFriend] = '#';

 }

 }

 btnDisplay.doClick();

 }

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 3.3

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

private void btnLocateNearActionPerformed(java.awt.event.ActionEvent evt) {

 int dist = 0;

 int nDist = 100;

 String messSentence = "Your nearest friend(s) is/are at: ";

 String mess = "";

 char rest = ' ';

 txaQ33.setText("");

 for (int r = 0; r < arrMall.length; r++) {

 for (int c = 0; c < arrMall[0].length; c++) {

 if (arrMall[r][c] == '#') {

 int diffR = Math.abs(r - rYou);

 int diffC = Math.abs(c - cYou);

 dist = diffR + diffC +1;

 if (c == 5) {

 rest = arrMall[r][c + 1];

 } else {

 rest = arrMall[r][c - 1];

 }

 txaQ33.append("Restaurant " + rest + " –

approximately " + (dist\*4.5) + " metres\n");

 if (dist <= nDist) {

 nDist = dist;

 mess = mess + " " + rest;

 }

 }

 }

 }

 txaQ33.append("\n" + messSentence + mess);

 }

**ANNEXURE G: SOLUTION FOR QUESTION 1: DELPHI**

unit Question1\_U;

interface

uses

 Windows, Messages, SysUtils, Variants, Classes, Graphics, Controls, Forms, Dialogs, StdCtrls, ExtCtrls, pngimage, Math;

type

 TfrmQuestion1 = class(TForm)

 pnlHeading: TPanel;

 gpbQuestion11: TGroupBox;

 Label1: TLabel;

 Label2: TLabel;

 edtName: TEdit;

 edtIDNumber: TEdit;

 Label3: TLabel;

 btnQuest11: TButton;

 gpbQuestion12: TGroupBox;

 Label4: TLabel;

 lblDiscount: TLabel;

 lblCharity: TLabel;

 imgDiscount: TImage;

 imgCharity: TImage;

 gpbQuest13: TGroupBox;

 Label7: TLabel;

 edtAmount: TEdit;

 edtDisplay: TEdit;

 btnQuest13: TButton;

 gpbQuestion14: TGroupBox;

 ckbBusiness: TCheckBox;

 Label9: TLabel;

 edtPart1: TEdit;

 Label10: TLabel;

 edtPart2: TEdit;

 Label11: TLabel;

 edtPart3: TEdit;

 btnQuest14: TButton;

 lblWelcome: TLabel;

 Label5: TLabel;

 procedure btnQuest11Click(Sender: TObject);

 procedure imgDiscountClick(Sender: TObject);

 procedure imgCharityClick(Sender: TObject);

 procedure btnQuest13Click(Sender: TObject);

 procedure btnQuest14Click(Sender: TObject);

 procedure FormActivate(Sender: TObject);

private

 { Private declarations }

 public

 { Public declarations }

 end;

var

 sName,sIdNumber: string;

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Code provided

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 frmQuestion1: TfrmQuestion1;

 typeCard: string;

 characters: string = '!@#$%]&\*^~';

implementation

{$R \*.dfm}

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 1.1

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

procedure TfrmQuestion1.btnQuest11Click(Sender: TObject);

var

 bNoSpace, bNoID, bIDLen: boolean;

begin

 sName := edtName.Text;

 bNoSpace := pos(' ',sName) = 0;

 if bNoSpace then

 showMessage('The name-surname field does not contain a space.');

 sIdNumber := edtIDNumber.Text;

 bNoID := length(sIDNumber)= 0;

 bIDLen := length(sIDNumber) <> 13;

 if bNoID then

 showMessage('An ID number must be entered.')

 else if bIDLen then

 showMessage('The ID number does not consist of 13 digits.');

 if (bNoSpace = false) AND (bNoID = false) AND (bIDLen = false) then

 lblWelcome.visible := true;

end;

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 1.2

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

procedure TfrmQuestion1.imgDonationClick(Sender: TObject);

begin

 lblCharity.Font.Name := 'Arial';

 lblCharity.Font.Style := [fsBold];

 lblDiscount.Font.Style := [];

 typeCard:='CH';

end;

procedure TfrmQuestion1.imgDiscountClick(Sender: TObject);

begin

 lblDiscount.Font.Name := 'Arial';

 lblDiscount.Font.Style := [fsBold];

 lblCharity.Font.Style := [];

 typeCard := 'DI';

end;

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 1.3

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

procedure TfrmQuestion1.btnQuest13Click(Sender: TObject);

var

 rDiscount,rDonation: real;

begin

 if typeCard = 'DI' then

 begin

 rDiscount := 1.5/100 \* StrToFloat(edtAmount.Text);

 edtDisplay.Text := '1.5% discount on your purchase amount is ' +

 FloatToStrF(rDiscount,ffCurrency,6,2) + '.';

 end

 else

 begin

 rDonation := Math.Ceil(StrToFloat(edtAmount.Text) / 100)\*3;

 edtDisplay.Text := 'An amount of '+FloatToStrF

 (rDonation,ffCurrency,6,2)+' will be donated to charity.';

 end

end;

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 1.4

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

procedure TfrmQuestion1.btnQuest14Click(Sender: TObject);

var

 sSymbol : string;

 iPosition: integer;

 bCard : char;

begin

 if ckbBusiness.Checked then

 bCard:='B'

 else

 bCard:='P';

 iPosition := StrToInt(sIdNumber[length(sIdNumber)]);

 sSymbol := characters[iPosition+1];

 edtPart1.Text := bCard + copy(sIDNumber,1,3);

 edtPart2.Text := IntToStr(iPosition)+sSymbol;

 edtPart3.Text := typeCard;

end;

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Code provided

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

procedure TfrmQuestion1.FormActivate(Sender: TObject);

begin

 CurrencyString := 'R';

end;

end.

**ANNEXURE H: SOLUTION FOR QUESTION 2: DELPHI**

**OBJECT CLASS:**

unit CardHolder\_U;

interface

 uses SysUtils,Math;

type

 TCardHolder = class(TObject)

 private

 fCardNumber: string;

 fCellNumber: string;

 fNumVisits: integer;

 fLoyaltyPoints: integer;

 fHealthLevel: char;

 public

 constructor create(sCardNumber,sCellNumber: string; iLoyaltyPoints: integer);

 procedure setNumVisits(iNumVisits: integer);

 Procedure increaseLoyaltyPoints(rTotal: real);

 procedure updateHealthLevel(rHealth,rTotal: real);

 function isCorrect(sAccessCode:string): boolean;

 function identifyStarShopper: string;

 function toString: string;

 end;

implementation

{ TCardHolder }

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 2.1.1

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

constructor TCardHolder.create(sCardNumber, sCellNumber: string;

 iLoyaltyPoints: integer);

begin

 fCardNumber := sCardNumber;

 fCellNumber := sCellnumber;

 fLoyaltyPoints := iLoyaltyPoints;

 fNumVisits := 0;

 fHealthLevel := 'S';

end;

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 2.1.2

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

procedure TCardHolder.setNumVisits(iNumVisits: integer);

begin

 fNumVisits:= iNumVisits;

end;

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 2.1.3

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

procedure TCardHolder.increaseLoyaltyPoints(rTotal: real);

var

 iLoyaltyPoints: integer;

begin

 fLoyaltyPoints := fLoyaltyPoints + trunc(rTotal) div 4;

end;

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 2.1.4

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

procedure TCardHolder.updateHealthLevel(rHealth, rTotal: real);

var

 rPercent: real;

begin

 rPercent := rHealth/rTotal \* 100;

 if rPercent < 10 then

 fHealthLevel:='S'

 else

 if rPercent >= 40 then

 fHealthLevel := 'P'

 else

 fHealthLevel := 'G'

end;

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 2.1.5

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Provided definition

function TCardHolder.isCorrect(sAccessCode: string): boolean;

var

 a: integer;

 b,iSum: integer;

 sCellNumber : string;

begin

 iSum:=0;

 sCellNumber := fCellNumber;

 for a := length(sCellNumber) downto 1 do

 if sCellNumber[a] = '0' then

 delete(sCellNumber,a,1);

 if length(sCellNumber) mod 2 = 0 then

 for b := 1 to (length(sCellNumber) div 2) do

 iSum := iSum + StrToInt(copy(sCellNumber,2\*b-1,2));

 if length(sCellNumber) mod 2 <> 0 then

 begin

 iSum:=StrToInt(sCellNumber[1]);

 for b := 1 to (length(sCellNumber) div 2) do

 iSum := iSum + StrToInt(copy(sCellNumber,2\*b,2));

 end;

 if StrToInt(sAccessCode) = iSum then

 result:=true

 else

 result := false;

end;

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 2.1.6

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

function TCardHolder.identifyStarShopper: string;

begin

 result := '';

 if ((fLoyaltyPoints > 2000) AND ( fnumVisits > 10)) OR ( fHealthLevel = 'P') then

 result := 'STAR shopper'

end;

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Code provided

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

function TCardHolder.toString: string;

begin

 result:= fCardNumber + #13 + 'Contact number: '+ fCellNumber +

13+#13+ 'Updated number of loyalty points:

+IntToStr(fLoyaltyPoints)+#13+'Number of visits: '+IntToStr(fNumVisits)+#13+'Health evaluation status: '+fHealthLevel;

end;

end.

**MAIN FORM UNIT: QUESTION2\_U.PAS**

unit Question2\_U;

interface

uses

 Windows, Messages, SysUtils, Variants, Classes, Graphics, Controls, Forms, Dialogs, StdCtrls, ExtCtrls, ComCtrls, CardHolder\_U;

type

 TfrmQuestion2 = class(TForm)

 Panel1: TPanel;

 gbpQuestion2\_1: TGroupBox;

 gpbQuestion2\_2: TGroupBox;

 Label1: TLabel;

 lblCardNumber: TLabel;

 cmbCardNumbers: TComboBox;

 Panel2: TPanel;

 Label2: TLabel;

 lblLoyaltyPoints: TLabel;

 lblCellNumber: TLabel;

 Panel3: TPanel;

 Label3: TLabel;

 edtCode: TEdit;

 btnQuest221: TButton;

 redOutput: TRichEdit;

 btnQuest222: TButton;

 procedure cmbCardNumbersChange(Sender: TObject);

 procedure btnQuest221Click(Sender: TObject);

 procedure btnQuest222Click(Sender: TObject);

 private

 { Private declarations }

 public

 { Public declarations }

 end;

var

 frmQuestion2: TfrmQuestion2;

 objCardholder : TCardHolder;

 myFile:Textfile;

implementation

{$R \*.dfm}

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 2.2.1

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

procedure TfrmQuestion2.btnQuest221Click(Sender: TObject);

var

 sCardHolder: string;

 sCellNumber: string;

 sLoyaltyPoints: string;

 sAccess: string;

 sLineOne, sLineTwo, sLineThree: string;

 rTotalSpent, rTotalHealth: real;

 iVisits: integer;

begin

 sCardHolder := cmbCardNumbers.items[cmbCardNumbers.ItemIndex];

 sCellNumber := lblCellNumber.Caption;

 sLoyaltyPoints := lblLoyaltyPoints.Caption;

 objCardholder := TCardHolder.create(sCardHolder, sCellNumber,

 StrToInt(sLoyaltyPoints));

 sAccess := edtCode.Text;

 if objCardholder.isCorrect(sAccess) then

 begin

 showMessage('The access code is correct.');

 rTotalSpent := 0;

 rTotalHealth := 0;

 iVisits := 0;

 assignFile(myFile, 'DataJanuary2017.txt');

 reset(myFile);

 while not eof(myFile) do

 begin

 readln(myFile, sLineOne);

 readln(myFile, sLineTwo);

 readln(myFile, sLineThree);

 if sLineOne = sCardHolder then

 begin

 rTotalSpent := rTotalSpent + StrToFloat(sLineTwo);

 rTotalHealth := rTotalHealth + StrToFloat(sLineThree);

 inc(iVisits);

 end; // end if

 end; // end while

 closeFile(myFile);

 objCardholder.increaseLoyaltyPoints(rTotalSpent);

 objCardholder.setNumVisits(iVisits);

 objCardholder.updateHealthLevel(rTotalHealth, rTotalSpent);

 btnQuest222.Enabled := true;

 end // end isCorrect

 else

 begin

 showMessage('Incorrect access code.');

 edtCode.Clear;

 end;

end;

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 2.2.2

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

procedure TfrmQuestion2.btnQuest222Click(Sender: TObject);

begin

 redOutput.Clear;

 redOutput.Lines.Add(objCardholder.toString);

 redOutput.Lines.Add(objCardholder.identifyStarShopper);

end;

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Code provided

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

procedure TfrmQuestion2.cmbCardNumbersChange(Sender: TObject);

begin

 edtCode.Clear;

 redOutput.Clear;

 btnQuest222.Enabled := false;

 case cmbCardNumbers.ItemIndex of

 0:

 begin

 lblLoyaltyPoints.Caption := '2130';

 lblCellNumber.Caption := '0812345678';

 end;

 1:

 begin

 lblLoyaltyPoints.Caption := '5723';

 lblCellNumber.Caption := '0822001100';

 end;

 2:

 begin

 lblLoyaltyPoints.Caption := '12908';

 lblCellNumber.Caption := '0740998877';

 end;

 3:

 begin

 lblLoyaltyPoints.Caption := '500';

 lblCellNumber.Caption := '0720951083';

 end;

 end;

end.

**ANNEXURE I: SOLUTION FOR QUESTION 3: DELPHI**

unit Question3\_U;

interface

uses

 Windows, Messages, SysUtils, Variants, Classes, Graphics, Controls, Forms, Dialogs, StdCtrls, ComCtrls, ExtCtrls, Grids;

type

 TfrmQuestion3 = class(TForm)

 GroupBox1: TGroupBox;

 Panel1: TPanel;

 btnQuest31: TButton;

 btnQuest33: TButton;

 cmbShops: TComboBox;

 GroupBox2: TGroupBox;

 redOutput: TRichEdit;

 Label1: TLabel;

 redGrid: TRichEdit;

 procedure btnQuest31Click(Sender: TObject);

 procedure cmbShopsChange(Sender: TObject);

 procedure btnQuest33Click(Sender: TObject);

 private

 { Private declarations }

 public

 { Public declarations }

 end;

var

 frmQuestion3: TfrmQuestion3;

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Provided code

//\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 arrMall:array[1..5,1..7] of string =(('A','X','O','\*','O','X','J'),('B','X','O','O','O','X','I'),('C','X','O','O','O','X','H'),('D','X','O','O','O','X','G'),('E','X','O','O','O','X','F'));

 arrPlace: array[1..10] of string;

implementation

{$R \*.dfm}

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 3.1

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

procedure TfrmQuestion3.btnQuest31Click(Sender: TObject);

var

 iRow, iCol: integer;

 sRow : string;

begin

 redGrid.Lines.clear;

 redGrid.Lines.add(' ');

 for iRow := 1 to 5 do

 begin

 sRow := ' ';

 for iCol := 1 to 7 do

 sRow := sRow + arrMall[iRow,iCol] + #9;

 redGrid.Lines.add(sRow);

 redGrid.Lines.add(' ');

 end;

end;

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 3.2

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

procedure TfrmQuestion3.cmbShopsChange(Sender: TObject);

var

 iRowChange:integer;

begin

 if cmbShops.Items[cmbShops.ItemIndex][1] in ['A'..'E'] then

 begin

 iRowChange:=cmbShops.ItemIndex + 1;

 arrMall[iRowchange,2]:='#'

 end

 else

 begin

 iRowChange:=10-cmbShops.ItemIndex ;

 arrMall[iRowchange,6]:='#';

 end;

 btnQuest31.Click;

end;

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

// Question 3.3

// \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

procedure TfrmQuestion3.btnQuest33Click(Sender: TObject);

var

 iRow,a: integer;

 iCol,iCounter: integer;

 rDistance,rLowest: real;

 sPlace:string;

begin

 redOutput.Clear;

 rLowest:=100;

 iCounter:=1;

 sPlace:='';

 for iRow := 1 to 5 do

 begin

 if arrMall[iRow,2] = '#' then

 begin

 rDistance:= 4.5\*(iRow+1)+4.5;

 if rDistance <= rLowest then

 begin

 inc(iCounter);

 rLowest:=rDistance;

 arrPlace[iCounter]:=arrMall[iRow,1];

 end;

 redOutput.Lines.Add('Restaurant '+ arrMall[iRow,1]+' –

 approximately '+FloatToStrF(rDistance,ffFixed,4,1)+ '

 metres');

 end;

 if arrMall[iRow,6] = '#' then

 begin

 rDistance:= 4.5\*(iRow+1)+4.5;

 if rDistance <= rLowest then

 begin

 inc(iCounter);

 rLowest:=rDistance;

 arrPlace[iCounter]:=arrMall[iRow,7];

 end;

 redOutput.Lines.Add('Restaurant '+ arrMall[iRow,7]+' –

 approximately '+FloatToStrF(rDistance,ffFixed,4,1)+ ' metres');

 end;

 end;

 for a := 1 to iCounter do

 sPlace := sPlace + ' ' +arrPlace[a];

 redOutput.Lines.Add(' ');

 redOutput.Lines.Add('Your nearest friend(s) is/are at: '+ sPlace);

end;

end.