

Date: Tuesday 20th June 2017
Commencement Time: 5:30 p.m.
Time Allowed: 2 hours *plus* 10 minutes reading time
Weighting: 40%
Marks: 100

Instructions

1. No writing or highlighting is permitted during reading time.
2. This is an **INDIVIDUAL** examination. You must not communicate with other students by any means.
3. This is a **CLOSED BOOK** examination.
4. Calculators and any form of dictionary are **NOT PERMITTED**.
5. You must answer **ALL** questions given.
6. Questions A.1 – A.10 are multiple choice questions. Each multiple choice question is worth one (1) mark and has only one correct answer. Write your answers on the BLUE Answer Sheet provided.
7. Questions B.1 – B.3 are descriptive answer questions. Write your answers in the Answer Booklet provided and commence the answer to each QUESTION in Section B on a new page.
8. Questions C.1 – C.4 are coding questions. Write your answers in the Answer Booklet provided and commence the answer to each QUESTION in Section C on a new page.
9. Take care with your handwriting, as illegible writing will not be marked.
10. You must return the BLUE Answer Sheet and the Answer Booklet to the supervisor, when finished.

Summary of Paper

Section	Type of Question	Marks
A	Multiple Choice	10
B	Descriptive Answer	30
C	Coding	60
	TOTAL MARKS	100

SECTION A**MULTIPLE-CHOICE QUESTIONS****10 MARKS**

A.1 When three values are contained within the square brackets, the last number represents the number of:

[1 mark]

- a) Classes
- b) Rows
- c) Planes
- d) Columns

A.2 Which method in the ArrayList class can be used to place a value onto the end of the ArrayList?

[1 mark]

- a) AddLast()
- b) AddLastIndex()
- c) Add()
- d) Insert()

A.3 Instance variables are the same as:

[1 mark]

- a) private member data
- b) local variables
- c) properties
- d) arguments

A.4 Given the following class definition, what would be a valid heading for a mutator?

[1 mark]

```
public class Student
{
    private string name;
    private double gpa;
}
```

- a) public double SetGpa(double gpaValue)
- b) public void SetGpa(double gpaValue)
- c) public double SetGpa()
- d) public void GetGpa(double gpaValue)

A.5 The statement that registers a Button object click event with the operating system is: [1 mark]

- a) `this.button1ClickEvent = new System.Windows.Forms.Button();`
- b) `private System.Windows.Forms.Button button1ClickEvent;`
- c) `this.Controls.AddRange(this.button1clickEvent);`
- d) `button1.Click += new System.EventHandler (this.button1_Click);`

A.6 The class heading `public class AForm : Form` indicates that: [1 mark]

- a) Form is a derived class of the AForm class
- b) AForm is the base class for the Form class
- c) The class being defined is identified as Form
- d) AForm inherits the members of the Form class

A.7 A marker that is placed in an application, indicating the program should halt execution when it reaches that point, is called a(n): [1 mark]

- a) exception
- b) pause
- c) watch
- d) breakpoint

A.8 The debugger in Visual Studio offers all of the following options for stepping, except: [1 mark]

- a) Step Into
- b) Step Over
- c) Step Through
- d) Step Out

A.9 When you are finished processing a text file, you should: [1 mark]

- a) Call the `Finished()` method
- b) Call the `Close()` method
- c) Throw an exception
- d) Erase the file

A.10 An in-memory representation of multiple rows and columns from the database is stored in what type of object? [1 mark]

- a) data provider
- b) data reader
- c) datagrid
- d) dataset

SECTION B**DESCRIPTIVE ANSWER QUESTIONS****30 MARKS****Directions:**

- It is recommended that answers are written in complete, clear and concise sentences. You should be aiming at making 10 valid and relevant points in your answer to each question.
- You may include examples of code to illustrate your answers, where appropriate.

B.1 Discuss how a GUI program should deal with users' errors and mistakes. [10 marks]

B.2 Discuss how a program's user interface should relate to the user's tasks. [10 marks]

B.3 Discuss the nature of a GUI C# multiple-forms project making sure that you cover the topics given below. [10 marks]

- a) Describe three special features of the **main** form.
- b) During design, explain how you can separate the business logic from the presentation layer.
- c) In a multi-form C# Windows application, explain what happens if you run the constructor for a form twice and explain how you can stop it from happening.
- d) In a multi-form C# Windows application, explain what can happen when you close a form and explain how you can stop it from happening.

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SECTION C**CODING QUESTIONS****60 MARKS**

- C.1** Write a method named **divideTwoNumbers** that accepts two strings as parameters, changes the cursor to waiting, converts them to integers, divides the first integer by the second integer, returns the result as a string and changes the cursor back to default regardless of whether an error occurred or not. You **must** use exception handling to display "This program cannot divide by zero" if the second number is zero. You **must** use exception handling to display "Please enter whole numbers" if either of the two numbers is not an integer.

[10 marks]

- C.2** Write a method named **readEmployees** that takes the name of a text file as a parameter, opens the text file, creates an employee object for each line of text read and returns an array list that holds the references (addresses in memory) of the employee objects. See below for the Employee class definition and the sample of the input text file.

[10 marks]

```
public class Employee
{
    private string lastName;
    private string firstName;
    private int    hours;
    private double hourlyRate;

    public Employee(string aLastName, string aFirstName,
                    int hoursIn, double rateIn)
    {
        lastName  = aLastName;
        firstName = aFirstName;
        hours     = hoursIn;
        hourlyRate = rateIn;
    }
}
```

Sample of text file:

```
Gordon, Jane, 40, 20.00
Hope, Sarah, 45, 19.50
```

[The remainder of this page is intentionally blank]

C.3 A video company uses a C# application to maintain a database with Members (**dtMember**) and Rentals (**dtRental**). In the application there is a master-detail relationship defined between the two tables: **dtMember** (master) and **dtRental** (detail). This relationship is named **REL_MemberRental**. The company wants to know some information about fines for overdue videos returned in the last 60 days.

Write a method named **findOverdueVideos** to find the number of members with fines, the total amount of fines owing, the average fine per member, and the **FirstName** and **LastName** of the member with the largest fine (you can assume that there is only one largest fine, no other fine will be of an equal amount). Only calculate fines where **DateDue** is less than **DateReturned**. Fines are \$2 per day overdue. Show the results in a multiline text box named **txtFines**.

Sample of output:

The number of members with fines is: 10

The total amount of fines owing is: NZ\$200.00

The average fine per member is: NZ\$20.00

The fine for the member with the largest fines is: NZ\$60.00

The name of the member with the largest fine is: Sarah Jones

[30 marks]

dtMember fields include:

- MemNum - type int, primary key.
- FirstName - type string
- LastName - type string

dtRental fields include:

- RentalNum - type int, primary key of Rental table.
- MemNum - type int, foreign key of Rental table pointing to Member table.
- DateDue - type DateTime
- DateReturned - type DateTime— zero if video not returned

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- C.4** Write a method named **savePoints** that takes the name (in a string) of a text file and a collection of **ColorPoints** as parameters, uses string builder to convert the collection of **ColorPoint** objects into a string and writes that string to the text file. See below for the **ColorPoint** class definition.

[10 marks]

```
public class ColorPoint
{
    private int X;
    private int Y;
    private Color DrawColor;

    public ColorPoint(int ptX, int ptY, Color theDrawColor)
    {
        X = ptX;
        Y = ptY;
        DrawColor = theDrawColor;
    }

    public ColorPoint(string XYColor)
    //create a ColorPoint object from a string of 3 integers
    //in string form split by commas
    //giving X, Y positions and the color value
    {
        string[] parts = XYColor.Split(',');
        X = Convert.ToInt32(parts[0]);
        Y = Convert.ToInt32(parts[1]);
        DrawColor = (Color.FromArgb(Convert.ToInt32(parts[2])));
    }

    public override string ToString()
    {
        return X.ToString() + "," + Y.ToString() + "," +
            DrawColor.ToArgb().ToString();
    }

    public void Draw(Graphics g)
    {
        Pen pn = new Pen( DrawColor, 3 );
        g.DrawEllipse(pn, X, Y, 25, 25);
    }
}
```

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ANSWER SHEET

FINAL EXAMINATION ISCG6421 GUI Programming Semester 1, 2017

STUDENT ID: _____

Multiple Choice Questions (circle one answer only)				
A.1	a	b	c	d
A.2	a	b	c	d
A.3	a	b	c	d
A.4	a	b	c	d
A.5	a	b	c	d
A.6	a	b	c	d
A.7	a	b	c	d
A.8	a	b	c	d
A.9	a	b	c	d
A.10	a	b	c	d
Mark :				/10