COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF APPLIED INFORMATION SYSTEMS

NOVEMBER 2019 – MAIN EXAMINATION

MODULE: Development Software 1B (C# Programming)

CODE: DEV1B01

DATE: 14 November 2019 (Main Examination)

DURATION: 3 Hours

TIME: 12h30 to 15h30

TOTAL MARKS: 180 (Weight: 50% of Final Mark)

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MODERATOR(S):   Dr Gideon Nimako (WITS)

NUMBER OF PAGES: 12 (excluding this cover page)

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INSTRUCTIONS:

- This is a CLOSED book examination.
- There are 180 marks available. 180 marks = 50%.
- Electronic devices, and smart watches are NOT allowed.
- You are given one question paper and one answer booklet. Answer ALL questions in the answer booklet. You must write your student number on the answer booklet, and hand it in.
- For all multiple-choice questions, indicate your answer clearly. Your answer must be a unique option. If two or more answers are indicated, you will be marked wrong for that question.
- The general University of Johannesburg policies, procedures and rules pertaining to written assessments apply to this examination.

Section A: Starter (60 marks)

1. Tiny Basic is one of the .Net Languages.

   (a) True

   (b) False

   2 MARK(S)

2. `Console.ReadKey();` at the end of a Console Program is **<u>not necessary</u>** to make the program run.

   (a) True

   (b) False

   2 MARK(S)

3. Which of the following is NOT a type of Application/Project in Visual Studio?

   (a) Xamarin Forms

   (b) WCF Service Library

   (c) Drone API

   (d) Silverlight Application

   (e) .NET Process

   (f) Console Applications

   2 MARK(S)

4. Visual Studio is a:

   (a) A Compiler

   (b) An Object-Oriented Programming Language

   (c) An Integrated Development Environment

   (d) A Visual Language for GUI Applications

   (e) All of the above

   2 MARK(S)

5. C# is a programming language with a single paradigm.

   (a) True

   (b) False

   (c) This depends on the instance

   2 MARK(S)

6. It is possible to develop iOS Apps using .Net Framework.

   (a) True

   (b) False

   (c) Only if development is done on Apple platform (such as a MacBook)

   (d) Depends on the functionalities of the intended App

   (e) Only for earlier versions of Visual Studio

   2 MARK(S)

7. Which of the following versions of Visual Studio is licensed for free use?

   (a) Free Version 2019

   (b) Professional Version 2019

   (c) Trial Version 2019

   (d) Community Version 2019

   (e) Enterprise Version 2019

   (f) C# Version 2019

   2 MARK(S)

8. The WebForms technology was part of .Net Framework 2.0.

   (a) True

   (b) False

   (c) Depends on the installed version or license

   2 MARK(S)

9. It is possible to use an online translator to convert a VB.NET code to C#.

   (a) True

   (b) False

   (c) Depends on the paradigm of these languages

   (d) This is only possible with C#

   (e) Works for Java, but not VB.NET

   2 MARK(S)

10. According to the classification of operators by the count of operands, determine the class of the operators in the following expressions:

    (a) `c = Math.Pow(p,2);`

    (b) `a = v - x - z;`

    (c) `c = PYTHAGORAS(a,b);`

    (d) `r += 35;`

    (e) `y++;`

    (f) `c = d % 5;`

    2 MARK(S)

11. The symbol $\in$ refer to a subset of, an element of, or containment. For example, $A \in B$ means A is contained in (is a subset of, or an element of) B. Use this information to determine which of the following statements are true. [**Note: this question allows more than one answer to be circled**].

   (a) namespace $\in$ namespace

   (b) namespace $\in$ class

   (c) class $\in$ namespace

   (d) main $\in$ class

   (e) namespace $\in$ main

   (f) interface $\in$ namespace

2 MARK(S)

12. .NET Framework includes a large class library. What is the name of this library?

2 MARK(S)

13. In one sentence, define the term: *Managed Code*?

2 MARK(S)

14. In not more than two sentences, explain what an Access Modifier is.

2 MARK(S)

15. What is the output of the CLR?

2 MARK(S)

16. The point of entry for Console Apps is `public static void main`. What is the point of entry for Windows Apps?

2 MARK(S)

17. In one sentence, explain the need for CLI.

2 MARK(S)

18. Who is a multilingual programmer?

2 MARK(S)

19. What is more important than being multilingual, especially in the context of answering the question: "*which programming language should I learn*"?

2 MARK(S)

20. The data type of the default value read when `Console.ReadLine();` is invoked is?

2 MARK(S)

21. To delay the execution of lines of code in C#, what method is needed? (State the complete reference with its namespace and class).

2 MARK(S)

22. The software environment in which programs written for .NET Framework execute is called?

2 MARK(S)

23. In one sentence, what is Event-driven programming?

2 MARK(S)

24. In the broad sense, .NET Framework consist of two major components. What are these components?

2 MARK(S)

25. Mention one data structure that can be accessed using the `System.Collections` namespace?

2 MARK(S)

26. In one sentence, distinguish between an object and a class.

2 MARK(S)

27. List any four (4) primitive data types in C#.

2 MARK(S)

28. A device that checks when the allocated memory for variables is no longer in use, to release it and make it available for allocation of new objects is called?

2 MARK(S)

29. The .NET feature that allows assemblies written in different languages to work together is called:

2 MARK(S)

30. A device that checks when the allocated memory for variables is no longer in use, to release it and make it available for allocation of new objects is called?

2 MARK(S)

Section B: Starter++ (40 marks)

1. Let X and Y be two Classes. Write a single line of code to indicate that Y inherits X.

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5 MARK(S)
</div>

2. Declare a new ArrayList named Arr. Write a code fragment to add every number in the range 1 to 200 to Arr.

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5 MARK(S)
</div>

3. Evaluate the fragment:

```
int x = 10;
int y = 5;
int z = !(x <= y) ? (x * 2) : (x + y);
```

<div align="right">

5 MARK(S)
</div>

4. Examine the code fragment below, determine what lines of code imply boxing, and unboxing operations.

```
int p, q;
object obj;
string aString;
p = 32;
obj = p;
p = 19;
q = (int)obj;
aString = q.ToString();
aString = 350.ToString();
```

<div align="right">

5 MARK(S)
</div>

5. Evaluate the following code fragment.

```
class Program
{
    static void Main(string[] args)
    {
        string show = "Uyajola 99";
        string phrase = "ibieda";
        string result = "";
        for(int i = phrase.Length-1; i >= 0; i--)
        {
            result += phrase.Substring(i, 1);
        }
        Console.WriteLine(result + show.Substring(3, 4));
    }
}
```

<div align="right">

10 MARK(S)
</div>

6. Write a method that takes a Vector of floating point numbers, and returns the sum of all elements of the Vector.

<div align="right">

10 MARK(S)
</div>

Section C: Evaluation of Code Fragments and Methods (40 marks)

Determine the output of the following code fragments without re-writing the code.

1. Fragment 1

    Here, assume $n = 3$.

```
1    class Program
2    {
3        static void Main(string[] args)
4        {
5
6            int n = int.Parse(Console.ReadLine());
7            Console.WriteLine(Add(Multiply(n,4),7));
8            Console.ReadKey();
9        }
10
11       public static int Add(int x, int y)
12       {
13           return x + y;
14       }
15       public static int Multiply(int x, int y)
16       {
17           return x * y;
18       }
19   }
```

5 MARK(S)

2. Fragment 2

```
1    class Program
2    {
3        static void Main(string[] args)
4        {
5            int x = 8;
6            int y = -2;
7            int z = DoAddition(x, y) + 1;
8            Console.WriteLine("Solution = {0}", z);
9            Console.ReadKey();
10       }
11
12       public static int DoAddition(int a, int b)
13       {
14           int sum = 2;
15           for (int i = a; i <= b; i++)
16           {
17               sum += i;
18           }
19           return sum;
20       }
21   }
```

5 MARK(S)

3. Fragment 3

   What is the output of the following code fragment, if n = 15, and if n = 2?

```
1    class Program
2    {
3        static void Main(string[] args)
4        {
5
6            int n = int.Parse(Console.ReadLine());
7            Console.WriteLine(getString(n));
8            Console.ReadKey();
9        }
10
11       public static string getString(int n)
12       {
13           if (n <= 9)
14           {
15               return "FINISHED";
16           }
17           else
18           {
19               return "X" + getString(n - 3);
20           }
21       }
22   }
```

10 mark(s)

4. Let `Education` be a class with the attributes: SchoolName, StartYear, EndYear, and DegreeStudied. Let `EducationHistory` be a List of `Education` objects.

   <u>**Write a method**</u> named `GetAverageEducationYears` that takes the `EducationHistory` list of objects, and returns the average number of years a person has spent studying [**This problem does not require a main program**].

15 mark(s)

5. Draw a class diagram for `Education` class in 4 above.

5 mark(s)

Section D: C# Programs (40 marks)

1. **DNA Sequence Generation with Recursion:**

   The canonical structure of DNA has four bases: thymine (T), adenine (A), cytosine (C), and guanine (G).

   Write a C# program that reads in an integer N, and generates N random sequences of length 20 each. Use recursion for this.

   A sample output: T-A-T-G-C-T-A-A-C-C-G-A-G-A-A-T-C-C-A-T.

   10 MARK(S)

2. **Win Swap:** Examine the Windows Form Design in Figure 1.
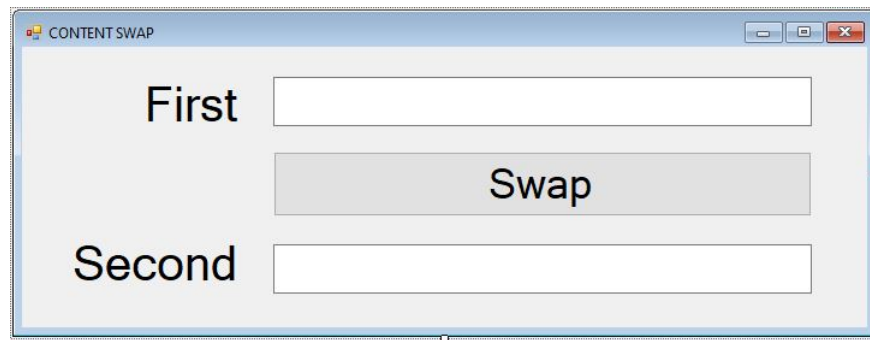

   Figure 1: The Swap Form

   Write lines of code for the Swap Button. The code should swap the content of the textboxes. Assume the name of the textboxes are: `txtFirst` and `txtSecond`. The button is named `btnSwap`.

   10 MARK(S)

3. **Ambiguous Dates:** An Ambiguous Date is a date that can be read differently, due to varying date format in different countries.

   Examples are:
   03/05/2019 and 05/03/2019: Either of these dates can be read as 3rd of May 2019, or 5th of March 2019.

Write a __method__ in C# that takes a date as a string of the form: `dd/mm/yyyy` or `mm/dd/yyyy`. Your method should return `TRUE` or `FALSE` depending on, if or not, the date is an *Ambiguous Date.*

__Sample Input:__ 05/03/2019
__Sample Output:__ TRUE

__Sample Input:__ 10/10/2019
__Sample Output:__ TRUE

__Sample Input:__ 20/02/2019
__Sample Output:__ FALSE

__Sample Input:__ 01/31/2019
__Sample Output:__ FALSE

__20__ MARK(S)

__Best of Luck — Luck is for the prepared.__

*** End of paper — Use space for rough work ***

*** Use space for rough work ***

*** Use space for rough work ***

*** Use space for rough work ***

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