1.1P: Preparing for OOP – Answer Sheet

Introduction

This paper 's answer sheet serves two purposes:

A. It serves as a revision for you of your previous learnings; and

B. It establishes a baseline understanding of your knowledge in key Computer Science topics.

As such this paper is divided into the following areas of knowledge:

A. Your experience with UNIX/DOS console commands;

B. Your ability to differenKate between data types (e.g. text) and informaKon categories (e.g. Ktle);

C. Your experience with compiler parsing and evaluaKon of expressions according to rules of precedence (e.g. BODMAS, also known as GEMS or PEMDAS);

D. Your understanding of Computer Science concepts and various compiler constructs such as blocks and scope;

E. Finally taking three steps, we want you to develop a program as follows:

1. starKng with a simple funcKon: you provide the pure logic and calculaKons, no input, nor output;
2. Then, in the second step, you write the main line code that invokes that simple funcKon. Your main line code will provide the necessary data, and then you will print out the result of the funcKon's calculaKon.
3. Finally we want you to add business logic to the main line program's code; that business logic will interpret the results of the funcKon, and inform your user with informaKon about the results.

Section A: Console commands

1. Explain the following terminal instruco ns
   a. cd: change directory (change the location of your file)
   b. pwd: print working directory (show path of current directory)
   c. mkdir: make a new directory
   d. cat: concatenate , reads the files content and write them to the standard output
   e. ls: concatenate , reads the files content and write them to the standard output

Section B: Data types and Information categories

1. Consider the following categories of informaKon, and suggest the most appropriate data type to store and represent each kind of informaKon:

Informa$on Category	Suggested Data Type
A person’s family name	String
A person’s age in years	Integer
A person's weight in Kilograms	Float
A telephone number	Interger
A temperature on the Kelvin scale	Float
The average age of a group of children	Float
Whether the student passed this task	Bool

2. Aside from the examples already provided above, please come up with your own examples of informaKon that could be stored as:

Data Type	Suggested Informa$on Category
String	A person name
Integer	The number of people in a family
Float	Average math mark of class 12B
Boolean	If the patient can makes it out of cancer

Sec$on C: Compiler evalua$on of expressions

1. Fill out the **last** two columns of the following table based on the expression and values we have supplied.
2. Evaluate the value of each expression under column 1, given its formula, values, and variables; use the given values (column 2) of any variable(s) in the expression.
3. IdenKfy the value of the results (column 3), and the data type the result is most likely to be (column 4) in a complier “friendly” form (e.g. Float):

Expression	Given	Result	Data Type
`76`		`76`	`string`
`True`		`True`	`bool`
`a`	`a = 3.1415927`	`3.1415927`	`float`
`1 + 2 * 3 + 4`		`21`	`integer`

a and False	a = True	False	bool
a or False	a = True	True	bool

a + b	a = 1
	b = 3
		4	integer

3 * a	a = 5	15	integer

a * 2 + b	a = 2.5
	b = 3
		8	integer

a + 2 * b	a = 2.5
	b = 3
		8.5	float

(a + b) * c	a = 2
	b = 4
	c = 6
		36	integer

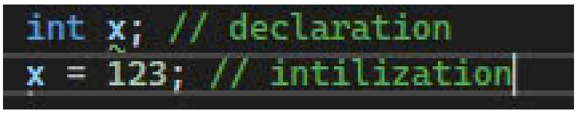
“Fred” + “ Astair”		Fred Astair	string
a + “ Rogers”	a = “Ginger”	Ginger Rogers	string

Sec$on D: Compiler Constructs and CS Concepts:

1. Using some code as an example, please explain the difference between **declaring** and **initialising** a variable.

The difference between the two is between the two is while declaring a variable is specifying its name

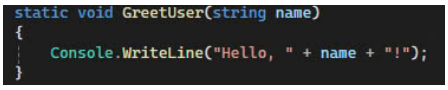
Paste your example code below:



```
int x; // declaration
x = 123; // intilization
```

2. Explain the term **parameter**. Write some **code** that demonstrates a simple of use of a parameter. You should show a procedure or function that uses a parameter, and how you would call that procedure or function.

Paste your example code below:



```
static void GreetUser(string name)
{
    Console.WriteLine("Hello, " + name + "!");
}
```

A parameter is a kind of variable that use d to store value that passed into the function or a method. Parameter can also me a datatype like a integer , float , etc...

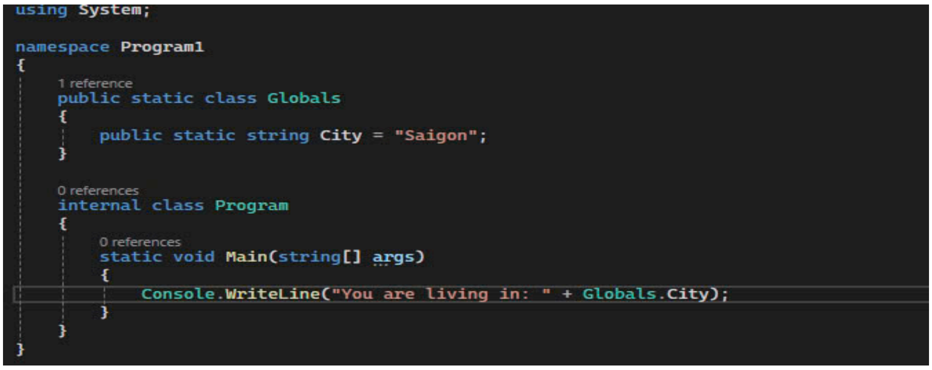
3. Using an **coding example**, describe the term **scope** as it is used in procedural

programming (not in business nor project management). Make sure you explain the differences of as many kinds of scope that you can idenKfy (at least two, and up to five).

Scope is like a region where a variable or a function is used. Variable and function
are only in scope within specific parts of code, determining if they can be referenced or modified there are global scope which is used to represents variables defined outside of a function or method ,they can be accessed anywhere within the class

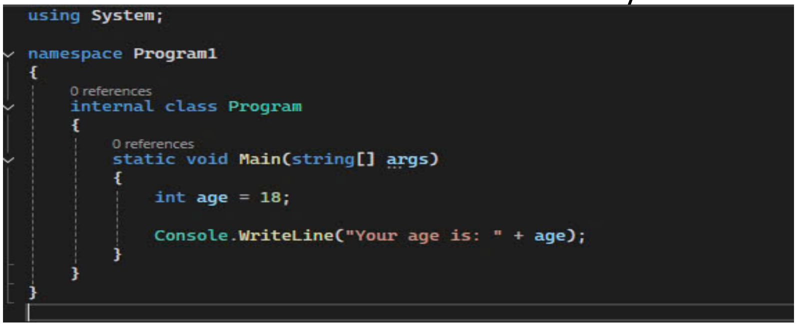
Global scope represents variables defined outside of a function or method. These are usually static members, meaning they can be accessed anywhere within the class.

example code:



```
using System;

namespace Program1
{
    public static class Globals
    {
        public static string City = "Saigon";
    }

    internal class Program
    {
        static void Main(string[] args)
        {
            Console.WriteLine("You are living in: " + Globals.City);
        }
    }
}
```

Local scope represents variables defined within a function and are only accessible within that function.



```
using System;

namespace Program1
{
    internal class Program
    {
        static void Main(string[] args)
        {
            int age = 18;

            Console.WriteLine("Your age is: " + age);
        }
    }
}
```

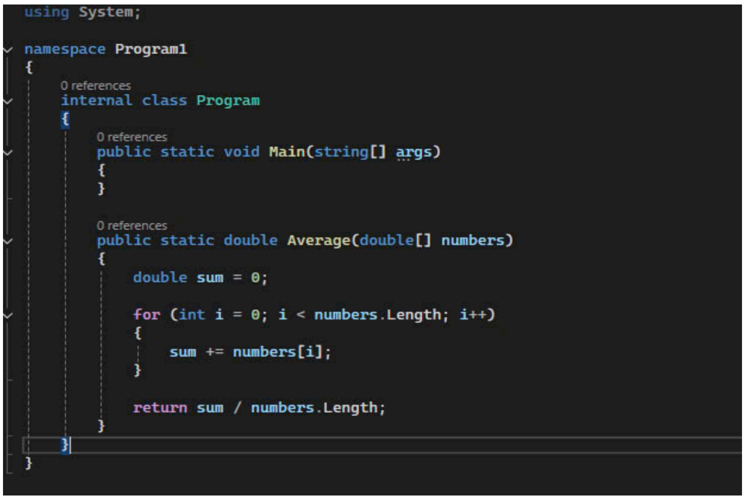
Section E: Implementing Algorithms, Data Handling, and Informing Results - Personalized Requirements

STEP 1:

In a procedural style, in any language you prefer, write a function called

Average, which accepts an array of integers, and returns the average of those integers.
Do not use any libraries for calculatingng the average: we want to see your understanding of algorithms.
You must demonstrate appropriate use of parameters, returning and assigning values, and the use of loop(s). Note — just write the functioon at this point.
In the next step we will ask you to invoke the function.
You should not have a complete program, nor even code that outputs anything at this stage. This is a function; and input/output and any business logic processing is the responsibility of the (main line) calling code.

paste your example function code below:



```
using System;

namespace Program1
{
    internal class Program
    {
        public static void Main(string[] args)
        {
        }

        public static double Average(double[] numbers)
        {
            double sum = 0;

            for (int i = 0; i < numbers.Length; i++)
            {
                sum += numbers[i];
            }

            return sum / numbers.Length;
        }
    }
}
```

Paste your example function code below:

STEP 2:

5. Using the same preferred language, write the main line calling code

   you wouldneed to (a) marshal the data, (b) invoke the funcon, (c) print out the result, and (d) **print out your student name and student Id**

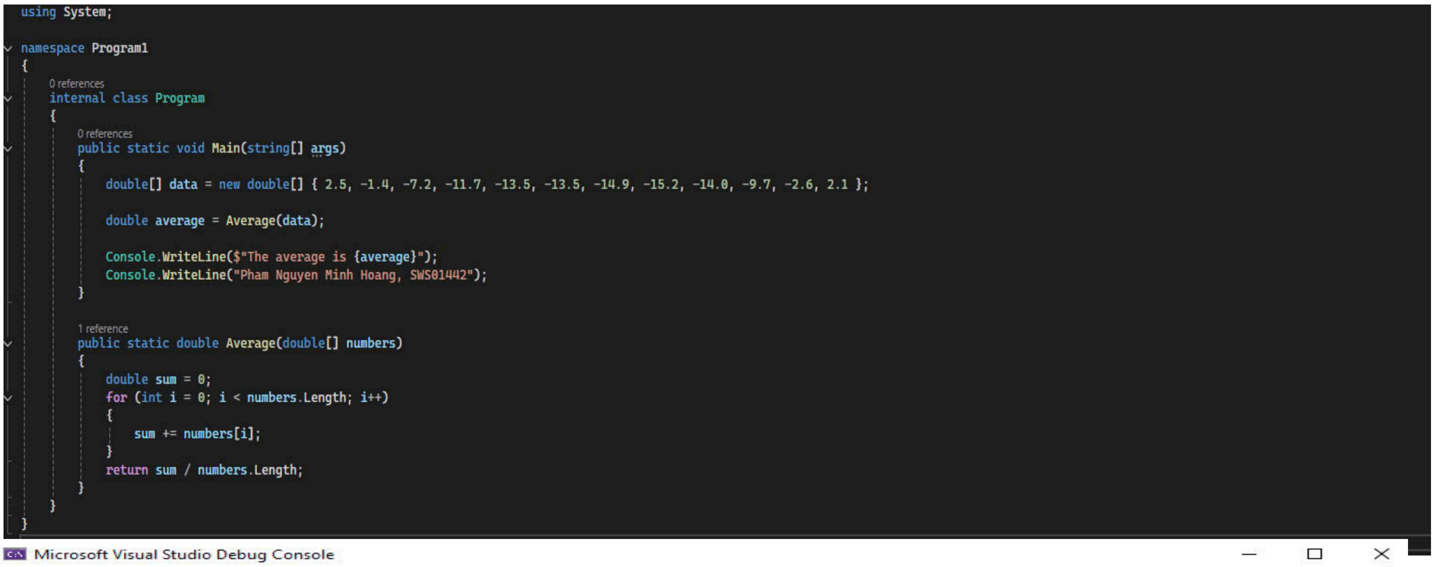
6. We do **not** require you to provide any input processing logic; you sim ply have provide the inline instanate of a collecon of data values (provided below) for the funcon to calculate the average of that data set.
   a. Sample data values
      2.5, -1.4, -7.2, -11.7, -13.5, -13.5, -14.9, -15.2, -14.0, -9.7, -2.6, 2.1
7. Note: your should have made **no changes** to your funcKon.

Paste all of your example code below:

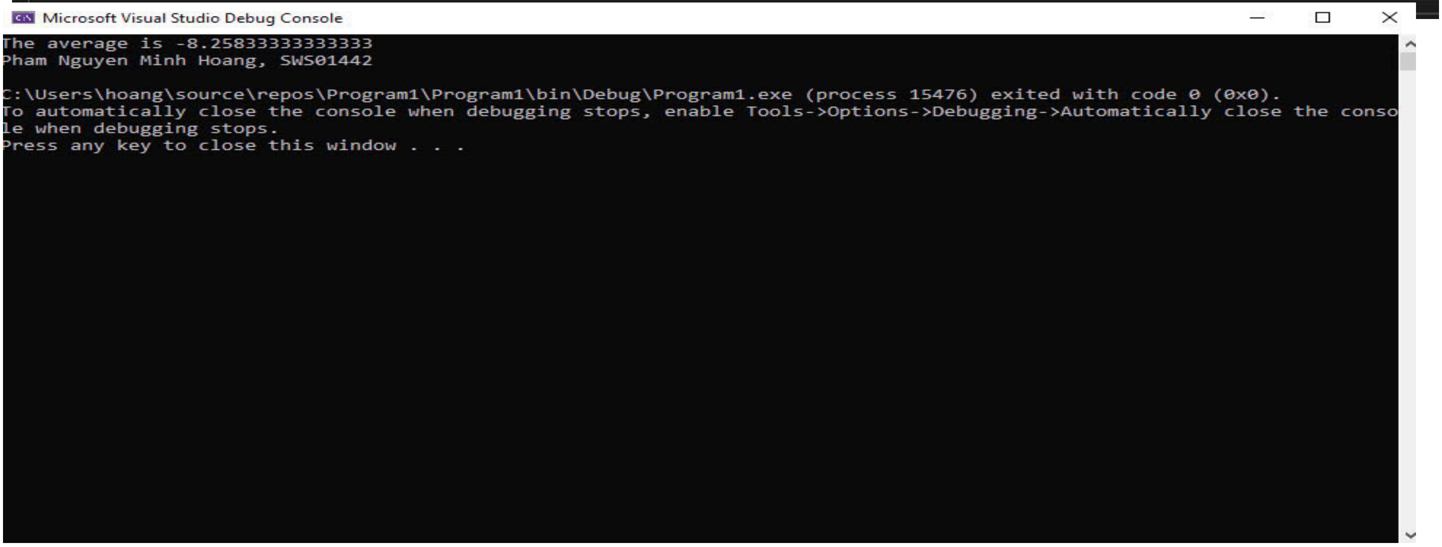
Paste your example code's output here:

8. Using the same preferred language, add to your exisKng main line code above,

the following business logic code for interpreKng the result of the function's calculations.

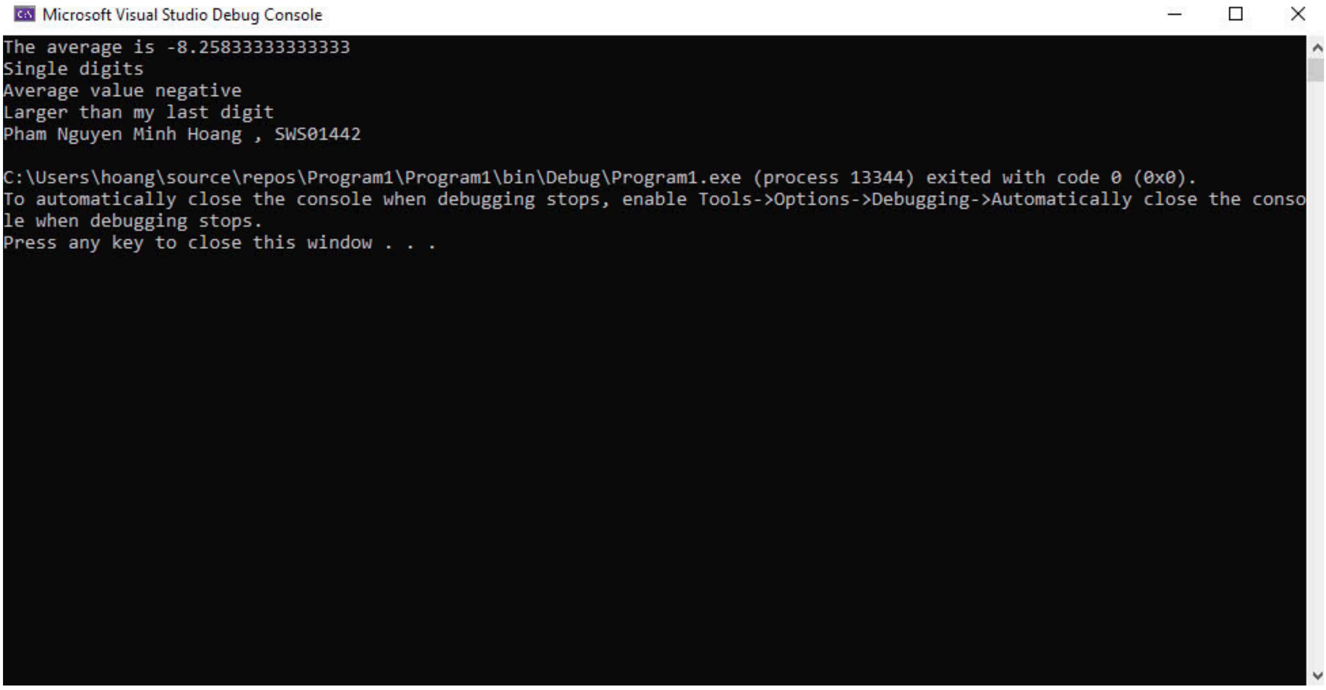


```
using System;

namespace Program1
{
    0 references
    internal class Program
    {
        0 references
        public static void Main(string[] args)
        {
            double[] data = new double[] { 2.5, -1.4, -7.2, -11.7, -13.5, -13.5, -14.9, -15.2, -14.0, -9.7, -2.6, 2.1 };

            double average = Average(data);

            Console.WriteLine($"The average is {average}");
            Console.WriteLine("Pham Nguyen Minh Hoang, SWS01442");
        }

        1 reference
        public static double Average(double[] numbers)
        {
            double sum = 0;
            for (int i = 0; i < numbers.Length; i++)
            {
                sum += numbers[i];
            }
            return sum / numbers.Length;
        }
    }
}
```



```
The average is -8.25833333333333
Pham Nguyen Minh Hoang, SWS01442

C:\Users\hoang\source\repos\Program1\Program1\bin\Debug\Program1.exe (process 15476) exited with code 0 (0x0).
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .
```

9. Print the message “Multiple digits” if the average is above or equal to 10. Otherwise, print the message “Single digits”.
10. And then, if the average is negative, add an additional line of output stating “Average value negative”.
11. Finally, if the last digit of the average is larger than the last digit of your Student ID, please print the message "**Larger than my last digit**". Otherwise, please print the correct message, either "**Equal to my last digit**" or "**Smaller than my last digit**".
12. Note, you should not have made any changes to your implemented function
13. Provide evidence of your program running, i.e. the code, its environment, and its run time outputs.



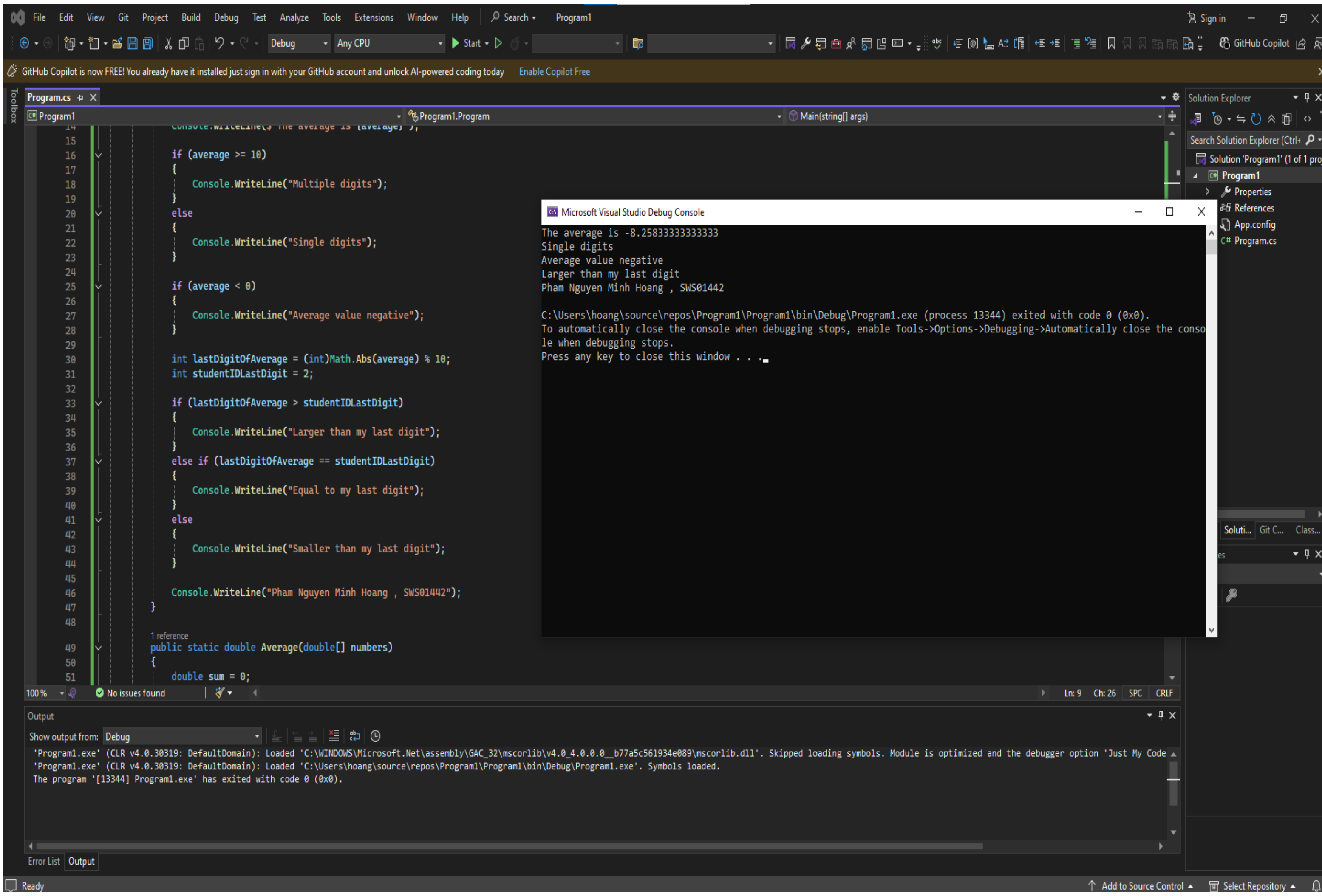
```
The average is -8.25833333333333
Single digits
Average value negative
Larger than my last digit
Pham Nguyen Minh Hoang , SWS01442

C:\Users\hoang\source\repos\Program1\Program1\bin\Debug\Program1.exe (process 13344) exited with code 0 (0x0).
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .
```

Paste your example code’s output here:

Finally on a new page paste a SINGLE screenshot of your program (main line and function) running with its outputs here:

End of Task

Please render your paper as a PDF and submit via CANVAS.



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```csharp
            Console.WriteLine($"The average is {average}");

            if (average >= 10)
            {
                Console.WriteLine("Multiple digits");
            }
            else
            {
                Console.WriteLine("Single digits");
            }

            if (average < 0)
            {
                Console.WriteLine("Average value negative");
            }

            int lastDigitOfAverage = (int)Math.Abs(average) % 10;
            int studentIDLastDigit = 2;

            if (lastDigitOfAverage > studentIDLastDigit)
            {
                Console.WriteLine("Larger than my last digit");
            }
            else if (lastDigitOfAverage == studentIDLastDigit)
            {
                Console.WriteLine("Equal to my last digit");
            }
            else
            {
                Console.WriteLine("Smaller than my last digit");
            }

            Console.WriteLine("Pham Nguyen Minh Hoang , SWS01442");
        }

        1 reference
        public static double Average(double[] numbers)
        {
            double sum = 0;
```

```
The average is -8.25833333333333
Single digits
Average value negative
Larger than my last digit
Pham Nguyen Minh Hoang , SWS01442

C:\Users\hoang\source\repos\Program1\Program1\bin\Debug\Program1.exe (process 13344) exited with code 0 (0x0).
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .
```

```
'Program1.exe' (CLR v4.0.30319: DefaultDomain): Loaded 'C:\WINDOWS\Microsoft.Net\assembly\GAC_32\mscorlib\v4.0_4.0.0.0__b77a5c561934e089\mscorlib.dll'. Skipped loading symbols. Module is optimized and the debugger option 'Just My Code
'Program1.exe' (CLR v4.0.30319: DefaultDomain): Loaded 'C:\Users\hoang\source\repos\Program1\Program1\bin\Debug\Program1.exe'. Symbols loaded.
The program '[13344] Program1.exe' has exited with code 0 (0x0).
```