1.1P: Preparing for OOP – Answer Sheet

Introduction

This 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 tour knowledge in key Computer Science topics.

As such, this answer sheet is divided into the following areas of knowledge:

A. Your experience with UNIX/DOS console commands;

B. Your ability to differentiate between data types (e.g., text) and information categories (e.g., title);

C. Your experience with parsing and evaluating expressions according to rules of precedence;

D. Your understanding of computer science concepts and various programming language constructs;

E. Finally we want you to develop a simple function called *Average*. You will develop a fully functional program in three steps:

   1) Implement the Average function,

   2) Define a main function calling Average, and

   3) Define tests and output the qualifies the result on calling Average on a given array of numbers.

Section A: Console commands

Explain the following terminal instructions:

a) ***cd***:

Change directory

b) ***pwd***:

it use to print the current working directory

c) ***mkdir***:

Make directory

d) ***cat***:

it uses to concatenates text strings or text variable values without removing leading or trailing blanks

e) ***ls***:

it uses to list files

Section B: Data types and Information Classes

1. Consider the following kinds of information, and suggest the most appropriate data type to store or represent each class of information:

Information 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	string
A temperature on the Kelvin scale	float

The average age of a group of children	integer
Whether a student has passed this task	boolean

2. Aside from the examples already provided in question 1, consider the following list and find an example of information that could be stored as:

Data type	**Suggested Information Category**
String	Mother's maiden name
Integer	number of months in a year
Float	height of a person
Boolean	whether a person has a car or not

Section C: Parsing and Evaluating Expressions

Fill out the **last** two columns of the following table. Parse and evaluate each expression. Enter the resulting value in column 3 and specify, in column 4, the data type of the expression in a complier "*friendly*" form (i.e., in a language format accepted, for example, in C, C#, or Pascal):

Expression	**Given**	**Value**	**Data Type**
6		6	integer
True		true	boolean

A	a = 2.5	2.5	float
1 + 2 * 3		7	integer
a **and False**	a = True	false	boolean
a **or False**	a = True	true	boolean
a + b	a = 1 b = 2	3	integer
2 * a	a = 3	6	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 = 1 b = 2 c = 3	9	integer
“Fred” + “ Flintstone”		Fred Flinstone	string
a + “ Rubble”	a = “Barney”	Barney Rubble	string

Section D: Computer Science and Programming Language Concepts:

1. Using an example, explain the difference between **declaring** and **initializing** a variable.

The difference between the two is we need to declare the variable with a certain data the and a value while we need to assign a value to the variable in the initialising stage. Declaration stage falls before the initialising stage. We need to declare the variable before initialising.

Insert your example here:

Initialization:

- Initialization of the 'age' variable
  Int Age;

Declaration

- Declaring a value to the age variable
  Age = 23;

2. Explain the concept *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.

A parameter can be called as a function or a method declaration that can be passed when it will be called.

Insert your example here:

```
class example2 { static void Func(string name)
{
    Console.WriteLine($"hello,{name}");
}
static void Main(string[] args)
{
     Func("a");
```

```
    Func("b");
    Func("c");
}
```

3. Using code examples, describe the term *scope* as it is being used in programming (not in business or project management). In your explanation, focus on procedural programming. Ensure that you cover as many kinds of scopes and their respective differences as possible. Your answer must detail at least two kinds of scopes.

Scope is a part of a program where a variable can be accessed, used, and modified. Local scope and Global scope are the two main kinds of scopes available.

Local scope: the Local scope is limited to a certain block of code, function, or a loop where the variable is declared. These cannot be accessed neither from outside nor another part of the program.

Global scope: Global scopes are variables where we can access throughout the program. These are not limited to the declaration region so that we can access them from the outside.

Insert your examples here:

```
namespace Project1

{

    internal class example3

    {

        public static int Glob = 20;

        static void Main(string[] args)

        {

            int LocV = 10;

            Console.WriteLine("Local scope ===> {0}", LocV);

            Console.WriteLine("Global scope ===> {0}", Glob);
```

```
        }

    }

}
```

Section E: Programming Practice:

1. Using procedural style programming, in any language you like, write a function called *Average*, which accepts an array of integers and returns the average of those integers. Do not use any libraries for calculating 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 control statements like a loop. Note — just write the function Average at this point. In the next question we will ask you to *invoke the Average function.* You are not required to develop a complete program or even specify code that outputs anything at this stage. Average is a pure function. Input/output and any business logic processing is the responsibility of the (main line) calling the function Average.

   Insert your code here:

```
using System;
namespace Project1
{
    class Program
    {
        static double average(int[] numbers)
        {
            int total = 0;
            int count = numbers.Length;

            for (int i = 0; i < count; i++)
            {
                total += numbers[i];
            }
            double average = (double)total / count;
```

```
            return average;
        }
```

2. Using the same language, write a main function you want to set up data (i.e., declare an array and initialize it with proper values), call the Average function, and print out the result. You are not required to provide input processing logic; you can have an inline instantiate of the collection of data values that the Average function needs to calculate the average of. Please use a reasonable data set, that is, the array must contain at least five elements of numerical type.

   Insert your code here:

```
using System;
namespace Project1
{
    class Program
    {
        static double average(int[] numbers)
        {
            int total = 0;
            int count = numbers.Length;

            for (int i = 0; i < count; i++)
            {
                total += numbers[i];
            }
            double average = (double)total / count;
            return average;
        }
        static void Main(string[] args)
        {
            int[] numberSet = { 100, 200, 300, 400, 500 };
            double result = average(numberSet);
            Console.WriteLine(result);
```

3. Again using the same language, extend the main function with some output statements. Print the message “Double digits” if the average is above or equal to 10. Otherwise, print the message “Single digits”. And then, if the average is negative (e.g., the average of a week’s temperature readings at the Australian base in the Antarctic),

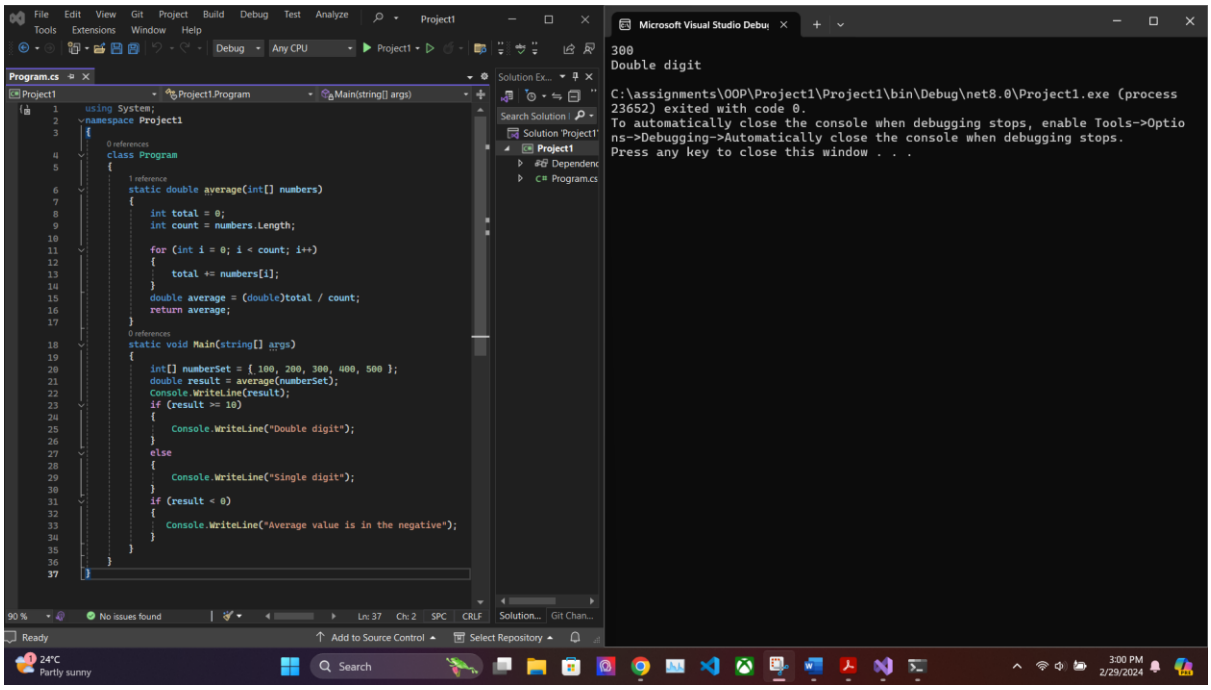
add an additional line of output highlighting that the “Average value is in the negative”. Provide screenshot(s) of your program running, that is, the code and the run time output.

Insert your code here:

```
using System;
namespace Project1
{
    class Program
    {
        static double average(int[] numbers)
        {
            int total = 0;
            int count = numbers.Length;

            for (int i = 0; i < count; i++)
            {
                total += numbers[i];
            }
            double average = (double)total / count;
            return average;
        }
        static void Main(string[] args)
        {
            int[] numberSet = { 100, 200, 300, 400, 500 };
            double result = average(numberSet);
            Console.WriteLine(result);
            if (result >= 10)
            {
                Console.WriteLine("Double digit");
            }
            else
            {
                Console.WriteLine("Single digit");
            }
            if (result < 0)
            {
               Console.WriteLine("Average value is in the negative");
            }
        }
    }
}
```

Insert your whole program here:



End of Task

All students have access to the Adobe Acrobat tools. Please print your solution to PDF and submit via Canvas.