INF 154
PRACTICAL 6
2023

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Denkleiers • Leading Minds • Dikgopolo tša Dihlalefi

At the end this practical you should be able…

1. To work with while loops
2. To avoid infinite while loops
3. To use while loops to solve common problems, such as, finding the sum, average, minimum, maximum and sorting numbers, etc.
4. To work with nested while loops

Hints for Practical 6

Make sure you understand the counter-controlled while loop examples used in Lecture 6 to display

- Numbers from 1-10 or Numbers from 99 to 0
- Odd numbers or Even Numbers
- The sum of all the looped numbers

Make sure you understand the sentinel controlled while loop examples used in Lecture 6 to demonstrate

- The index position of an item in a list box
- The number of times a program takes to guess a defined variable.

For this practical session, you should be able to use

- The different windows form toolbox controls (L1)
- Input-process-output programming model (L2 and L3)
- Variables (L2 and L3)
- Decision statements (L4 and L5)
- Random number generators (L5)

What are we going to do?

- Practical 6a: Completed in class.
- Practical 6b: Completed in class.
- Practical 6c: Take home practical.

Practical Exercise 6a

Objective: In this practical section, you are tasked with creating a windows form program which will change a gender into a string or character format. The program should also be able to display the count of each gender. This should be archived using **While Loops & Decision Statements**.

<u>The conversion formats are as follows</u>

"Male" to "M"

"Female" to "F"

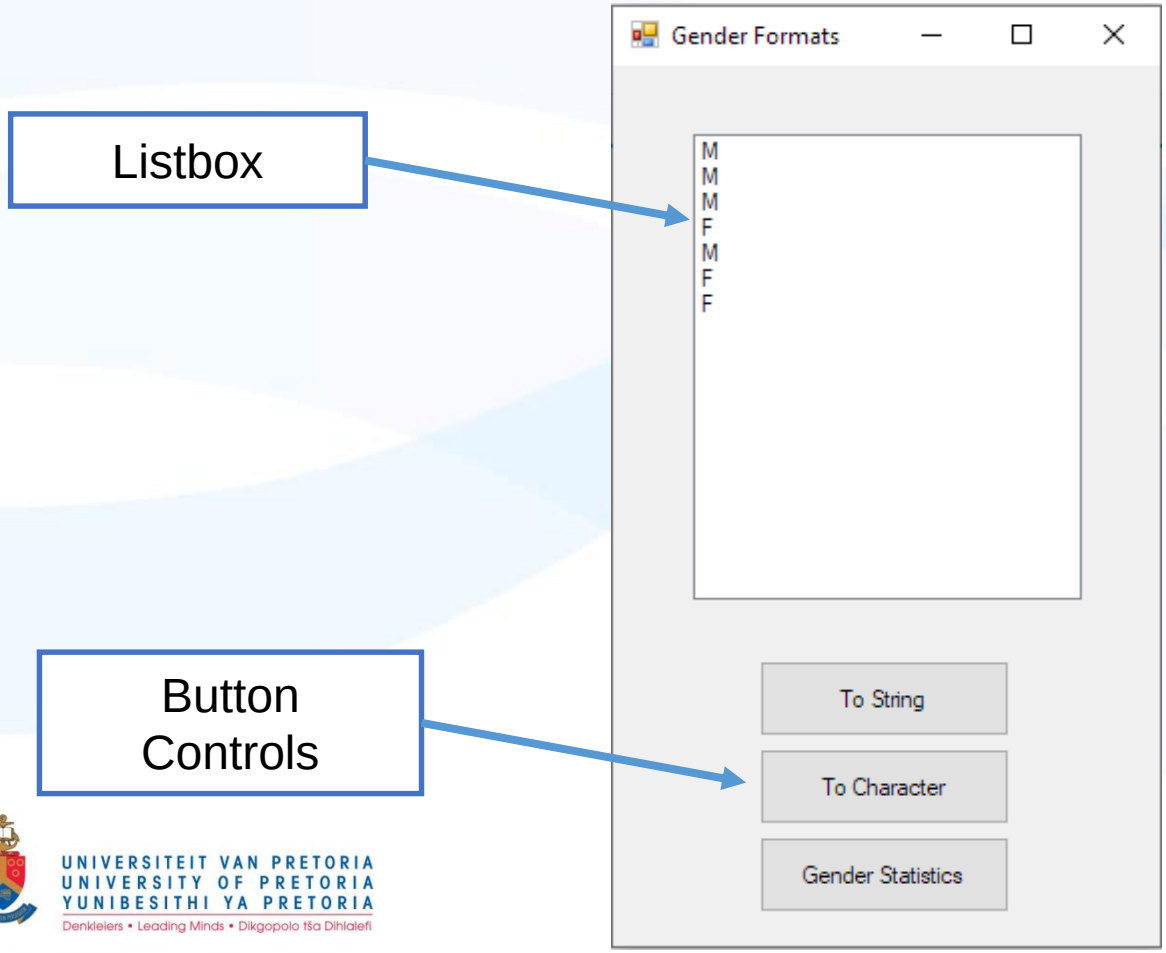
"M" to "Male"

"F" to "Female"

Practical Exercise 6a

Expected Screen Design

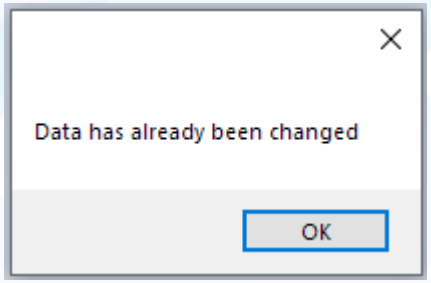
Create the following form with the appropriate controls. When the form loads, all the genders should be in the same format. Remember to name your controls accordingly (e.g for a button you would use btnGenderStats).



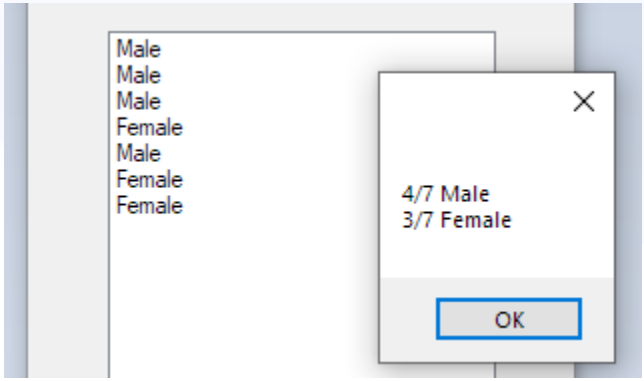
Practical Exercise 6a

Expected Functionality

- When the To String button is clicked, All the gender characters should change from characters to string formats.
- When the To Character button is clicked, All the gender strings should change from string to character.
- When same button is clicked multiple times in succession, A single message box should display as follows.



- When the display button is clicked, A message box showing the male and female count should be shown.



Practical Exercise 6a

Solution - btnToString

```
1 reference
private void btnToString_Click(object sender, EventArgs e)
{
    // string to character
    int i = 0;
    while (i < lstGenders.Items.Count)
    {
        if (lstGenders.Items[i].ToString() == "M")
        {
            lstGenders.Items[i] = "Male";
        }
        else if (lstGenders.Items[i].ToString() == "F")
        {
            lstGenders.Items[i] = "Female";
        }
        else
        {
            MessageBox.Show("Data has already been changed");
            break;
        }
        i++;
    }

}
```

Practical Exercise 6a

Solution - btnToCharacter

```
private void btnToCharacter_Click(object sender, EventArgs e)
{
    // character to string
    int i = 0;
    while (i < lstGenders.Items.Count)
    {
        if (lstGenders.Items[i].ToString() == "Male")
        {
            lstGenders.Items[i] = 'M';
        }
        else if (lstGenders.Items[i].ToString() == "Female")
        {
            lstGenders.Items[i] = "F";
        }
        else
        {
            MessageBox.Show("Data has already been changed");
            break;
        }
        i++;
    }
}
```

Practical Exercise 6a

Solution - btnGenderStats

```
1 reference
private void btnGenderStats_Click(object sender, EventArgs e)
{
    int i = 0;
    int maleCounter = 0, femaleCounter = 0;
    while (i < lstGenders.Items.Count)
    {
        if (lstGenders.Items[i].ToString() == "Male" || lstGenders.Items[i].ToString() == "M")
        {
            maleCounter++;
        }
        else
        {
            femaleCounter++;
        }
        i++;
    }
    MessageBox.Show( maleCounter + "/" + i + " Male" + "\n" + femaleCounter + "/" + i + " Female" );
}
```

Practical Exercise 6b

Objective: In this practical section, you are tasked with creating a windows form program which will print out a n^{th} -by- n^{th} multiplication table. Ensure proper space placement for readability. This should be archived using **Nested while Loops & a Random Generator**.

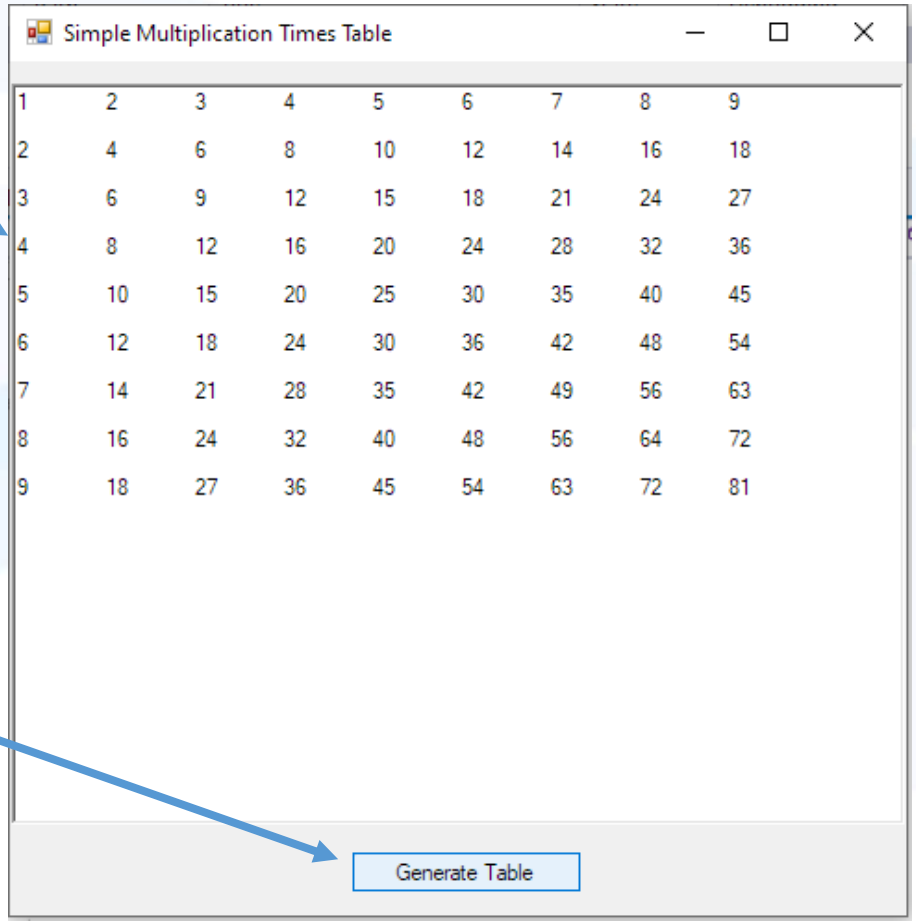
Practical Exercise 6b

Expected Screen Design

Create the following form with the appropriate controls. When the Generate Table button is clicked: It should appear as follow: Remember to name your controls accordingly (e.g for a button you would use btnGenerate).

Richtextbox

Button



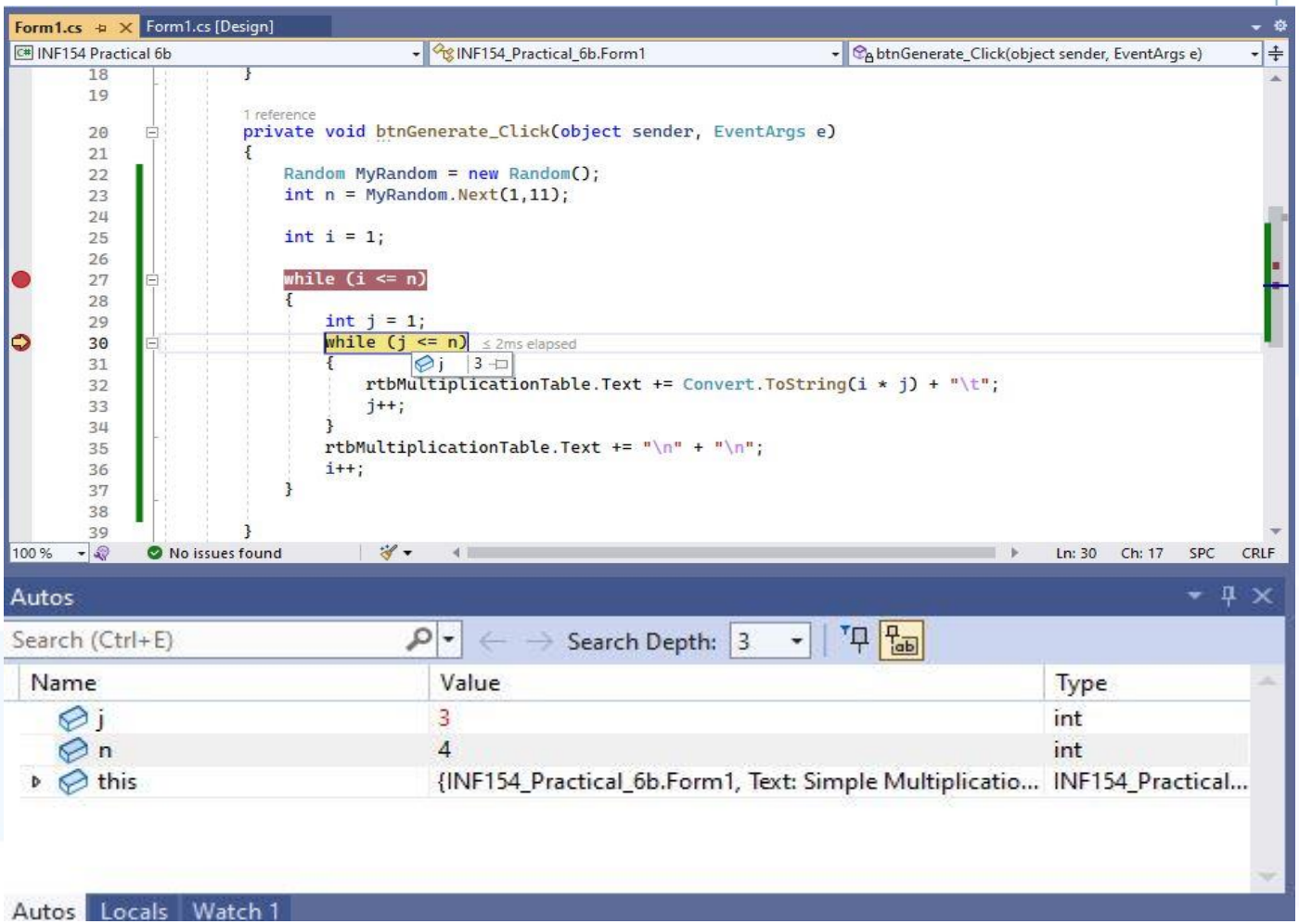
Practical Exercise 6b

Solution - btnGenerator

```
1 reference
private void btnGenerate_Click(object sender, EventArgs e)
{
    Random MyRandom = new Random();
    int n = MyRandom.Next(1,11);

    int i = 1;

    while (i <= n)
    {
        int j = 1;
        while (j <= n)
        {
            rtbMultiplicationTable.Text += Convert.ToString(i * j) + "\t";
            j++;
        }
        rtbMultiplicationTable.Text += "\n" + "\n";
        i++;
    }

}
```

Practical Exercise 6b

Make use of breakpoints to test and evaluate your code:



Practical Exercise 6c

Objective: In this practical section, there will be two parts. For part one--you are tasked with creating a program that will generate random grades between 0-100. This program should be able to do the following:

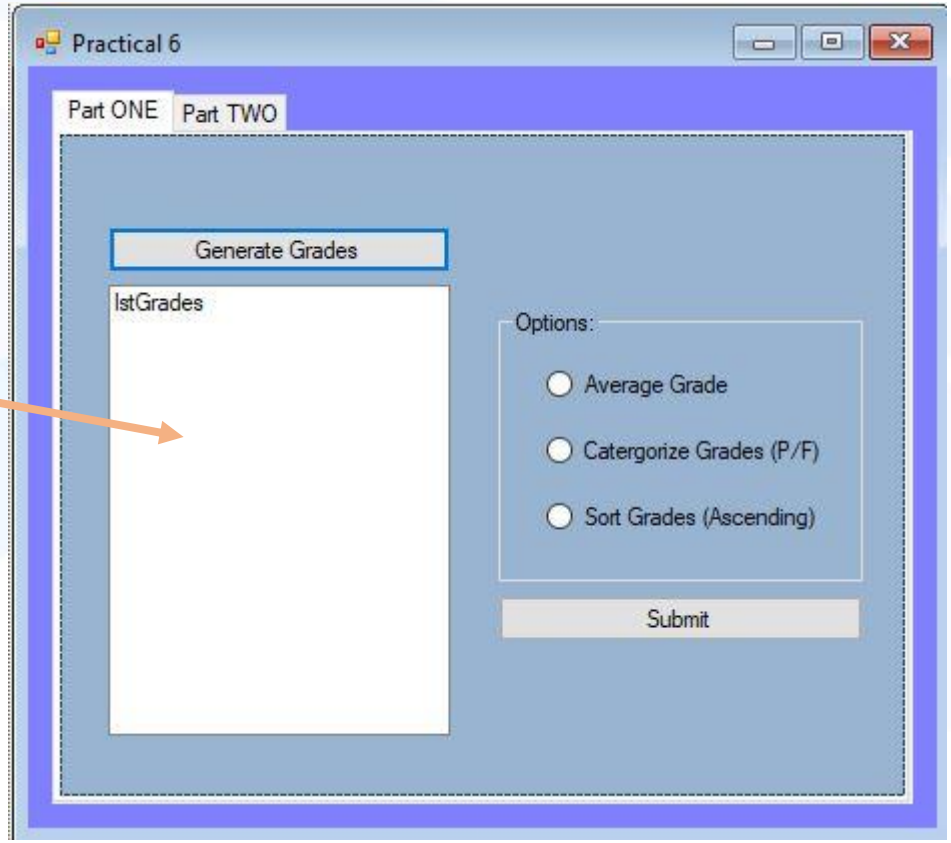
- to calculate the average of all of its grades.
- to tell you how many fall into the pass/fail category.
- to sort the grades in ascending order.

Practical Exercise 6c

Part One

Expected Screen Design

Create the following form with the appropriate controls. When the form loads, all the genders should be in the same format. Remember to name your controls accordingly (e.g for a button you would use btnSubmit).

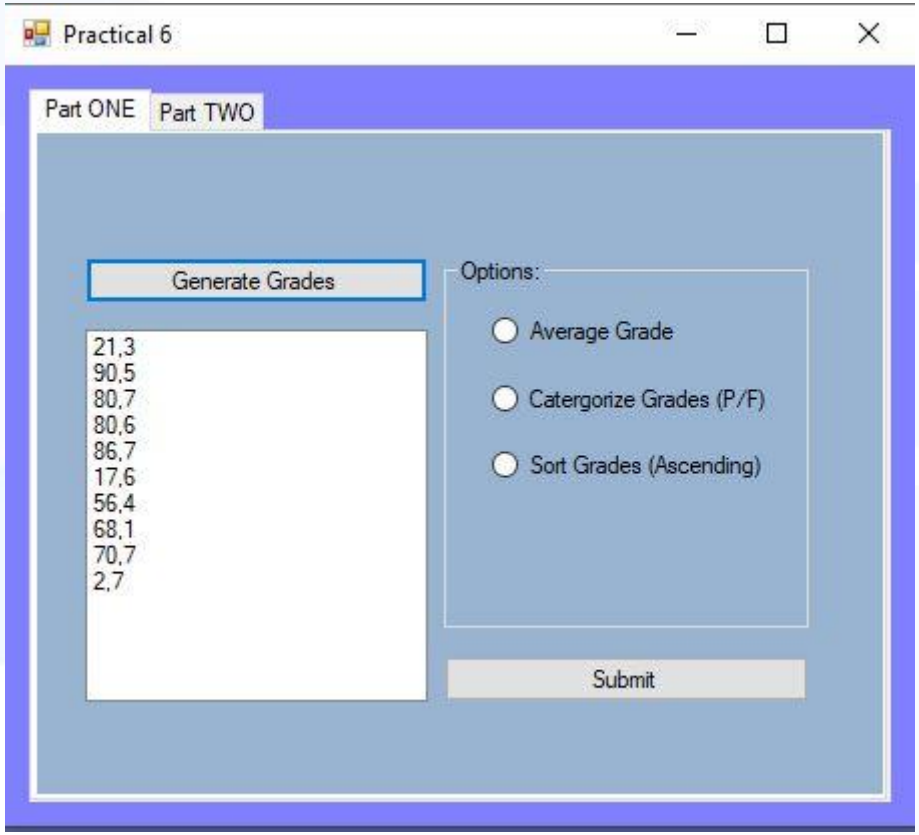


Listbox

Practical Exercise 6c

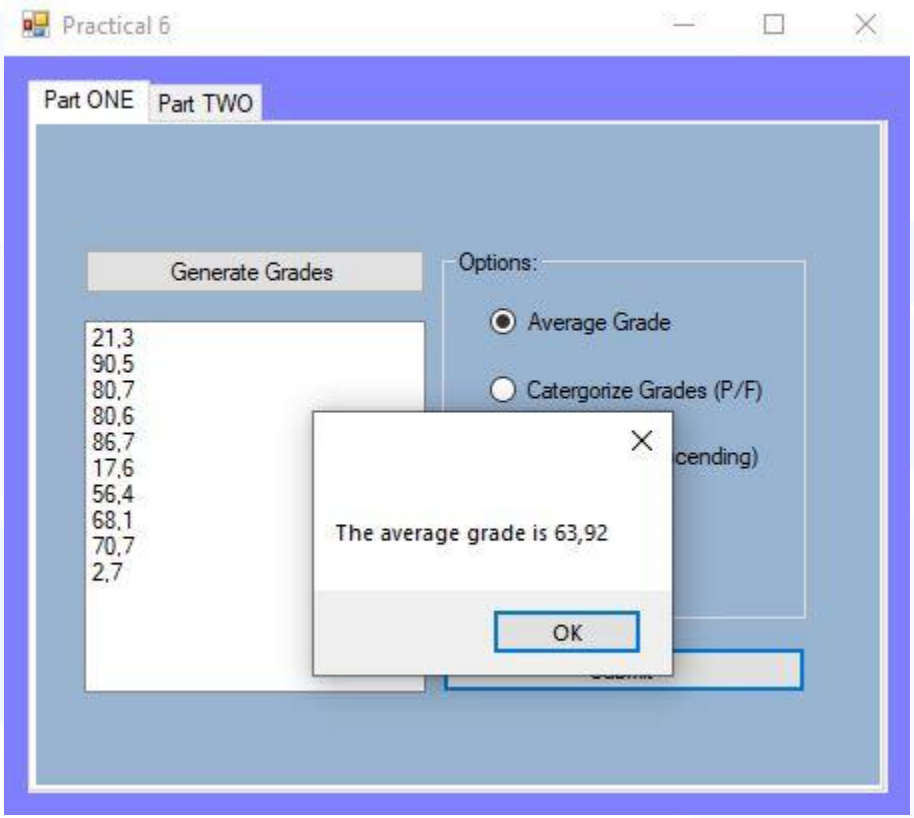
Expected Functionality

1.By clicking the button Generate Grades, the program should populate the list box with 10 random grades with one decimal point.



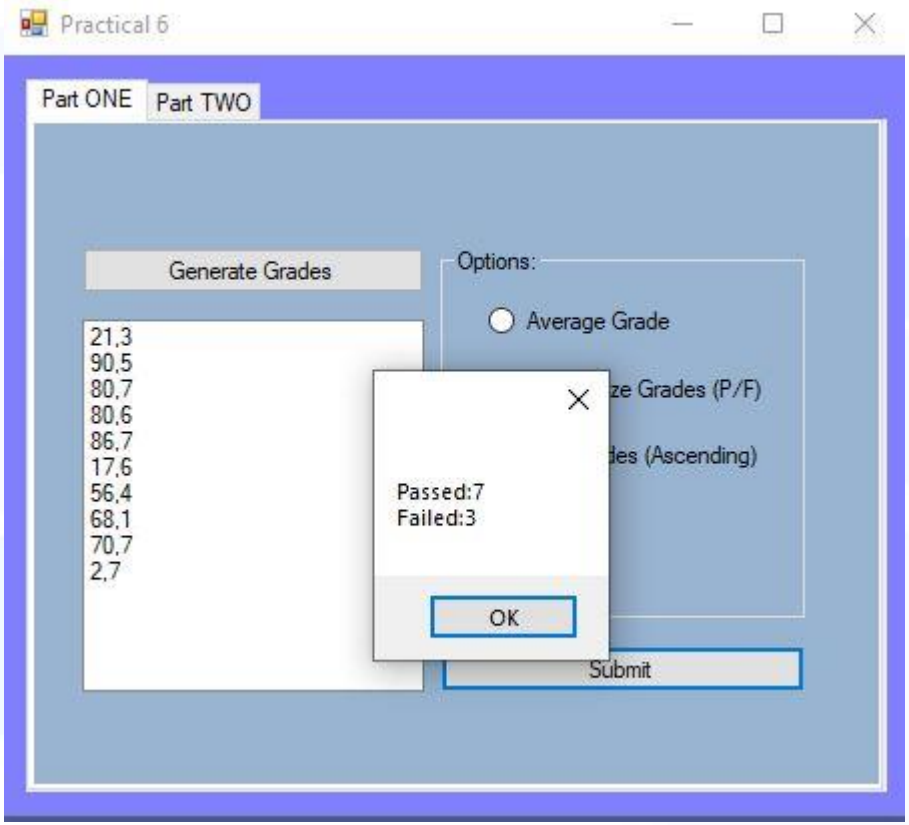
Practical Exercise 6c

2.By selecting the average grade radio button and clicking the submit button, the program should calculate the average grade.



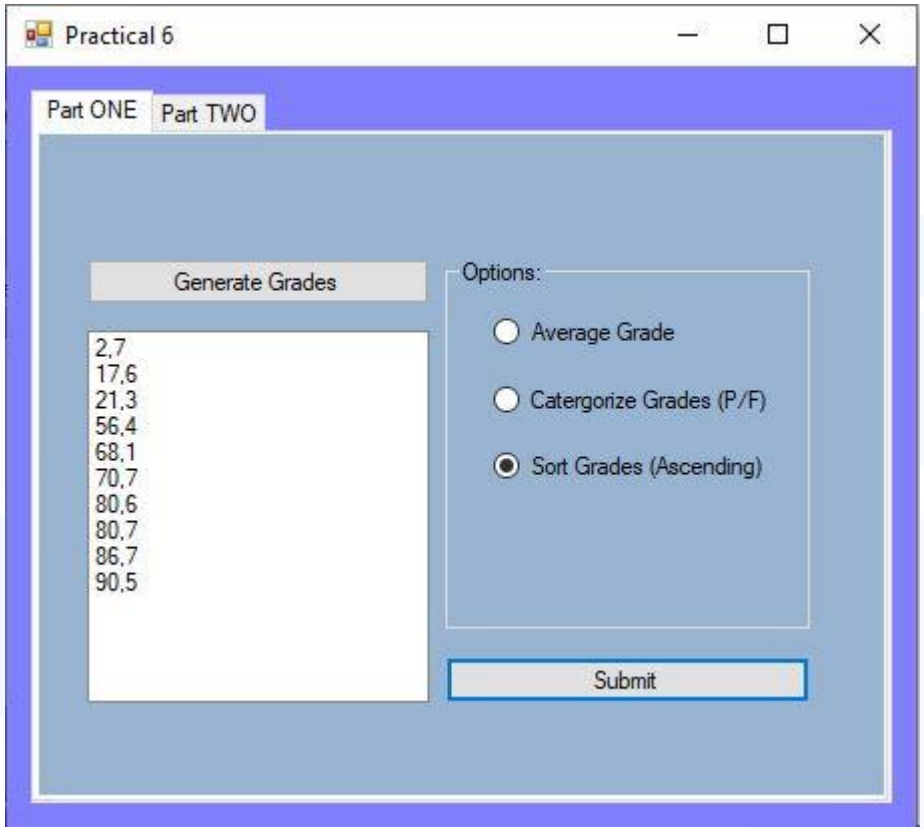
Practical Exercise 6c

3.By selecting the categories grade radio button and clicking the submit button, the program should display the counts of passes and fails.



Practical Exercise 6c

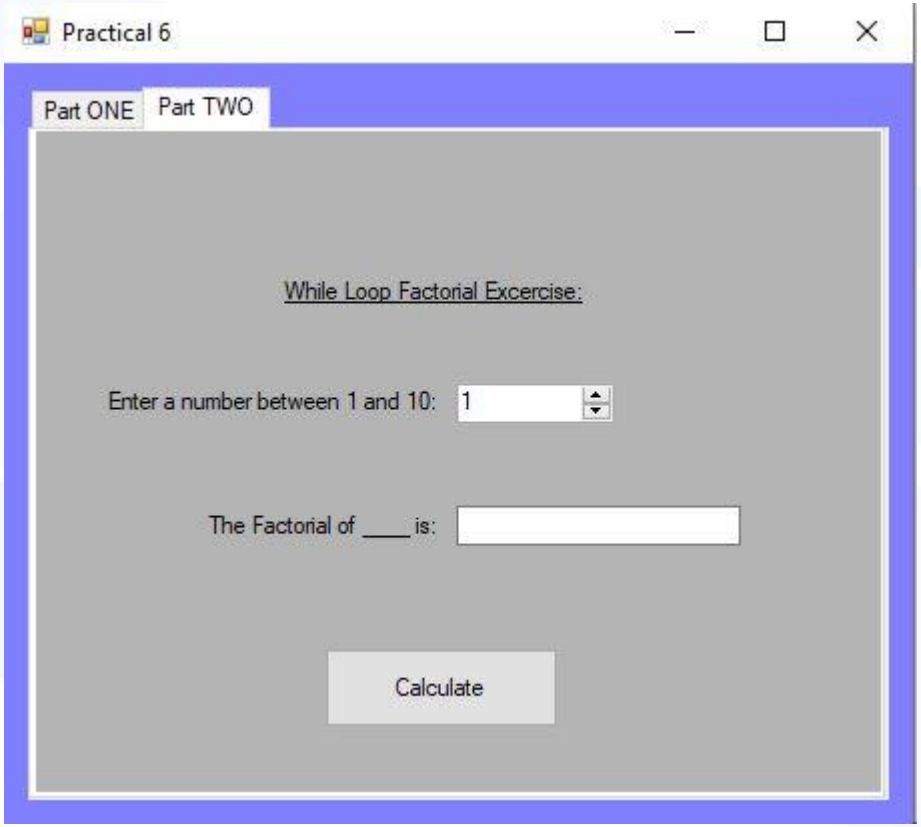
4.By selecting the sort grades radio button and clicking the submit button, the program should sort the grades in ascending order.



Practical Exercise 6c

Part Two

This is how Part two's interface should look. You will need to create a program that will allow the user to enter a value between 1 and 10 and calculate the factorial of the inputted number and enter that value in the textbox.

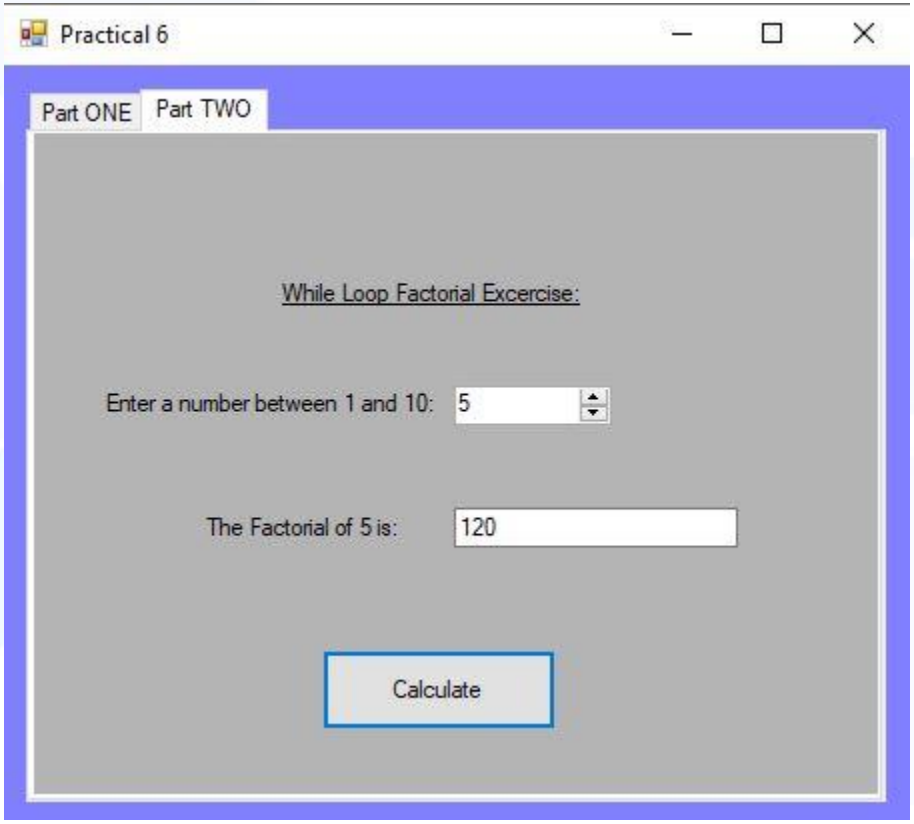


Practical Exercise 6c

Part Two

In this example, the user entered 5… which meant that the calculation was

5 x 4 x 3 x 2 x 1 = 120



Practical 6c Submission

Submit your Practical 6c project on ClickUP as follows:

- **Due Date: 1 May 2023.**
- Name your project, ***student number* Practical 6** and compress (zip folder) your project.
- Submit it under the Practical 6 submission link.