QUESTION 1 (MARKS 40)

1.1 Design and implement a program that computes final averages for a set of grades. The program reads the grades from a user. [Marks 20]The format of a grade line is:

N grades1, grades2, ……., grades5

Where N is total number of students and grades is the *i*th score. All scores must be between 0 and 100.

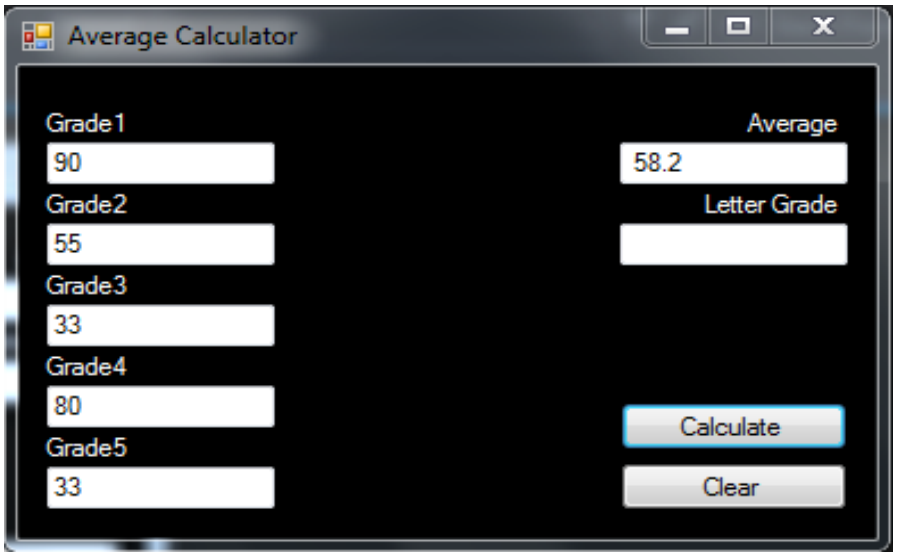
The program reads the grades from the user, calculate and display the average.

The weighted average is computed as: **(20)**

NB: Your program should validate its input. That is, it should make sure each score is between 0 and 100 and that each student has *n* scores/ grades. If a student's grades are invalid, the program should display an error message. The program should contain modules / functions that handles validating the input.

Answer:

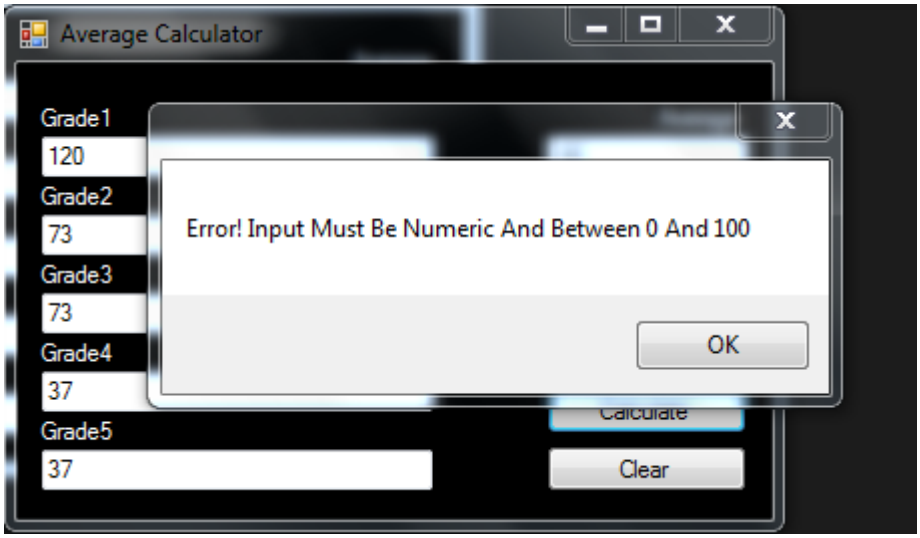
Program screenshot



Code Screenshot

```
Public Class Form1

    0 references
    Private Sub Button1_Click(sender As Object, e As EventArgs) Handles Button1.Click
        TextBox6.Text = Str((Val(TextBox1.Text) + Val(TextBox2.Text) + Val(TextBox3.Text) + Val(TextBox4.Text) + Val(TextBox5.Text)) / 5)
    End Sub
End Class
```

Program screenshot



Code screenshot

```
Dim input As String
input = (TextBox1.Text)
If Not IsNumeric(input) Or input < 0 Or input > 100 Then
    MessageBox.Show("Error! Input Must Be Numeric And Between 0 And 100")
Else
    TextBox1.Text = input
End If

Dim input2 As String
input2 = (TextBox2.Text)
If Not IsNumeric(input2) Or input2 < 0 Or input2 > 100 Then
    MessageBox.Show("Error! Input Must Be Numeric And Between 0 And 100")
Else
    TextBox2.Text = input2
End If

Dim input3 As String
input3 = (TextBox3.Text)
If Not IsNumeric(input3) Or input3 < 0 Or input3 > 100 Then
    MessageBox.Show("Error! Input Must Be Numeric And Between 0 And 100")
Else
    TextBox3.Text = input3
End If

Dim input4 As String
input4 = (TextBox4.Text)
If Not IsNumeric(input4) Or input4 < 0 Or input4 > 100 Then
    MessageBox.Show("Error! Input Must Be Numeric And Between 0 And 100")
Else
    TextBox4.Text = input4
End If

Dim input5 As String
input5 = (TextBox5.Text)
```

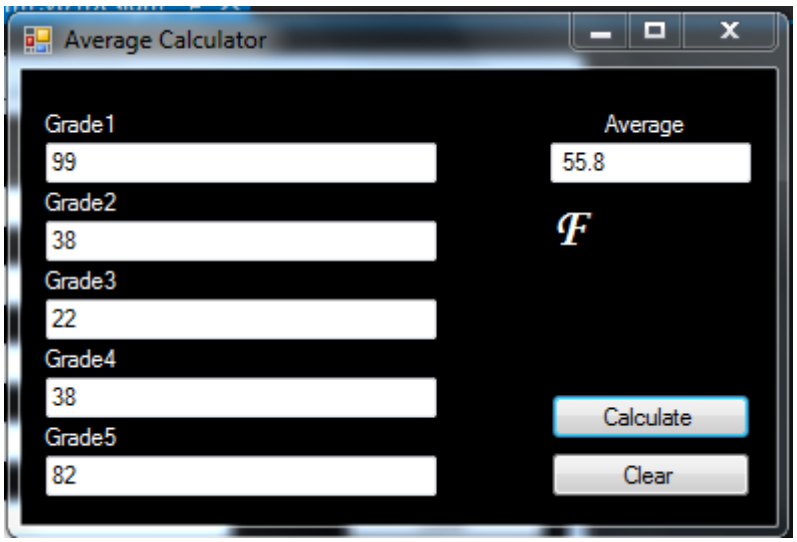
1.2 Extend 1.1 so that the program also determines a final letter grade. **(10)**

The letter grade ranges are:

AVERAGE	LETTER GRADE
0-59	F
60-69	D
70-79	C
80-89	B
90-100	A

Answer:

Program screenshot



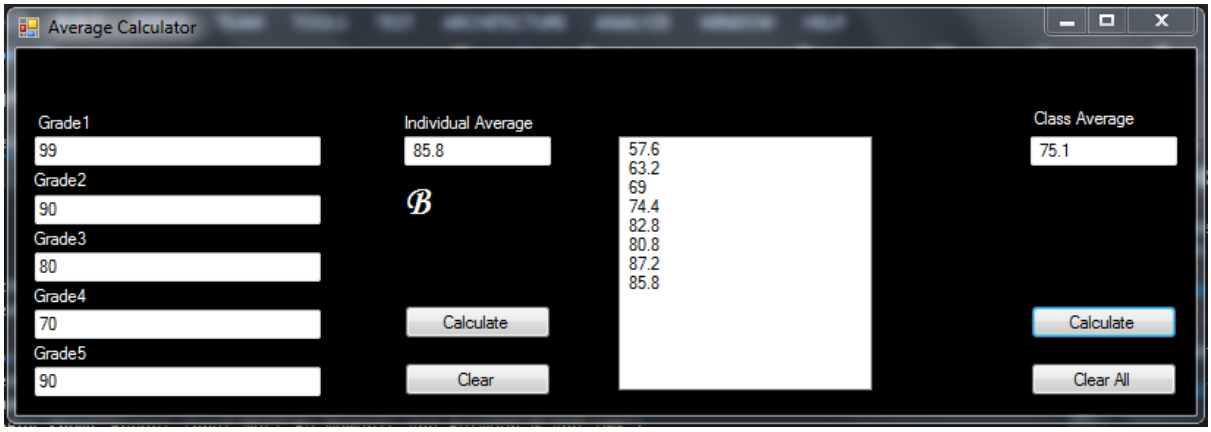
Code screenshot

```
Dim lettergrade As Integer
lettergrade = (TextBox6.Text)
If TextBox6.Text <> "" Then
    Select Case lettergrade
        Case 90 To 100
            Label7.Text = "A"
        Case 80 To 89
            Label7.Text = "B"
        Case 70 To 79
            Label7.Text = "C"
        Case 60 To 69
            Label7.Text = "D"
        Case Else
            Label7.Text = "F"
    End Select
End If
```

1.3 Extend 1.2 so that the program computes and display an overall average for the class **(10)**

Answer:

Program screenshot



Code screenshot

```
Dim sum As Double
For x As Integer = 0 To ListBox1.Items.Count - 1
    sum += CDbl(ListBox1.Items(x))
    TextBox7.Text = Str(sum / ListBox1.Items.Count)
Next
```

QUESTION 2 (MARKS 30)

Design and implement a program that prompts a user for the sides *a, b,* and *c* of a triangle, and if these sides do represent a triangle, the program displays the area of that triangle. The sides represent a valid triangle if the sum of the lengths for any two sides is greater than the length of the remaining side. The area of a triangle can be computed from its sides using the

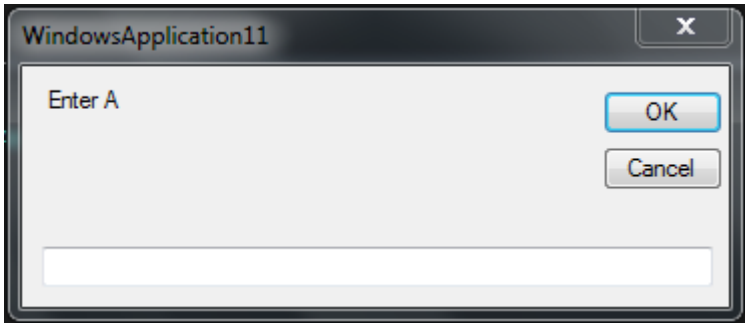
formula: $\sqrt{s*(s-a)*(s-b)*(s-c)}$ where *s* is half of the sum the sides (i.e. it is the half the perimeter)

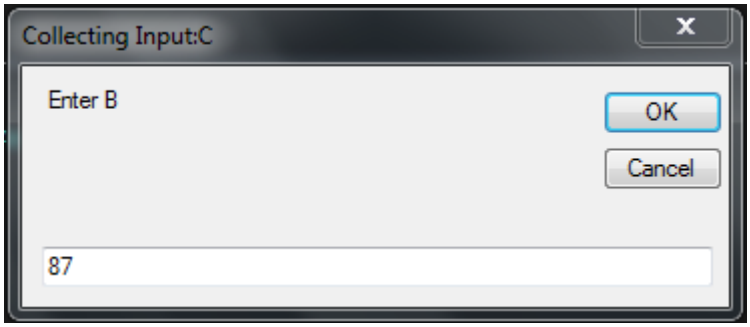
Instructions:

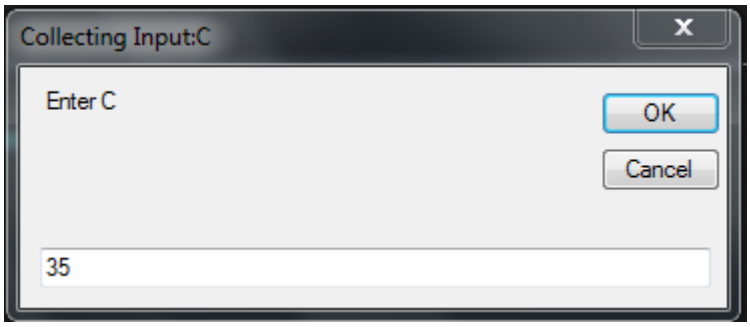
2.1.1 Write a sub procedure PROMPT () to get three double values from the user. **(15)**

Answer:

Program screenshot







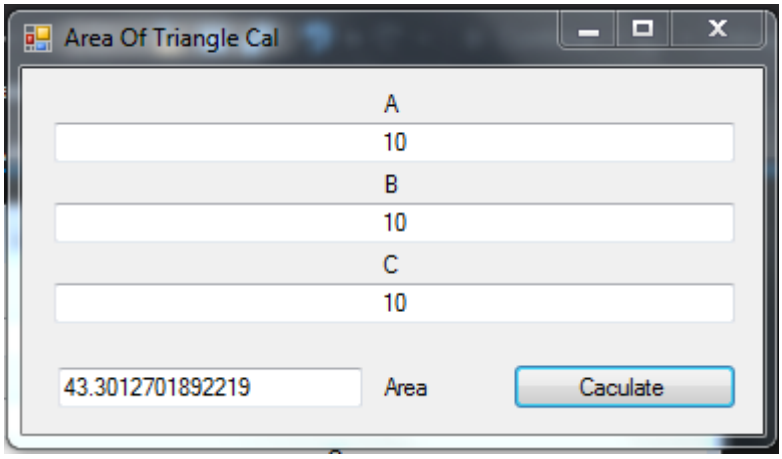
Code screenshot

```
Dim prompt As String = String.Empty
Dim title As String = String.Empty
Dim defaultResponse As String = String.Empty
Dim answer As Object
prompt = "Enter A"
title = ""
defaultResponse = " "
answer = InputBox(prompt, title, defaultResponse)
TextBox1.Paste(answer)

prompt = "Enter B"
title = "Collecting Input:C"
defaultResponse = " "
answer = InputBox(prompt, title, defaultResponse)
TextBox2.Paste(answer)

prompt = "Enter C"
title = "Collecting Input:C"
defaultResponse = " "
answer = InputBox(prompt, title, defaultResponse)
TextBox3.Paste(answer)
```

2.1.2 Write a function CALCULATE_AREA to calculate area of the triangle. **(15)**

Answer:

Program screenshot



Code screenshot

```
Dim a As Integer
Dim b As Integer
Dim c As Integer
a = TextBox1.Text
b = TextBox2.Text
c = TextBox3.Text
Dim s As Double = (a + b + c) / 2
Dim Area As Double = Math.Sqrt(s * (s - a) * (s - b) * (s - c))
TextBox4.Text = Area
Return
```

QUESTION 3 (MARKS 30)

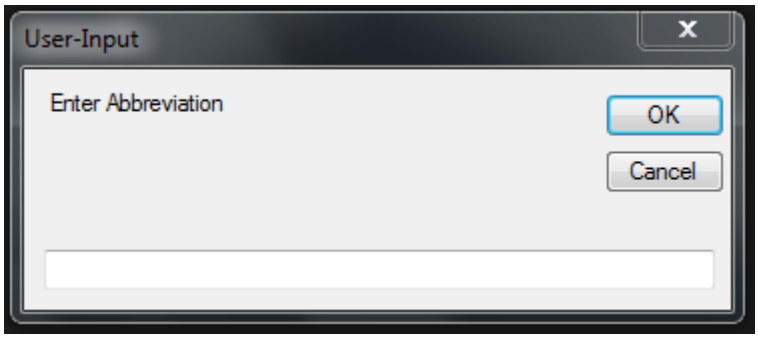
Design and implement a program that prompts for and accepts two characters as input. The program determines whether the two characters are a valid province abbreviation. If the characters are valid province abbreviation, the program prints the characters (in uppercase) followed by a colon (:), followed by province name, a space and the word Valid. If the characters are not a valid abbreviation, the program prints the characters (in uppercase) followed by a colon (:), followed by a space and the words *Not Valid*. For example:

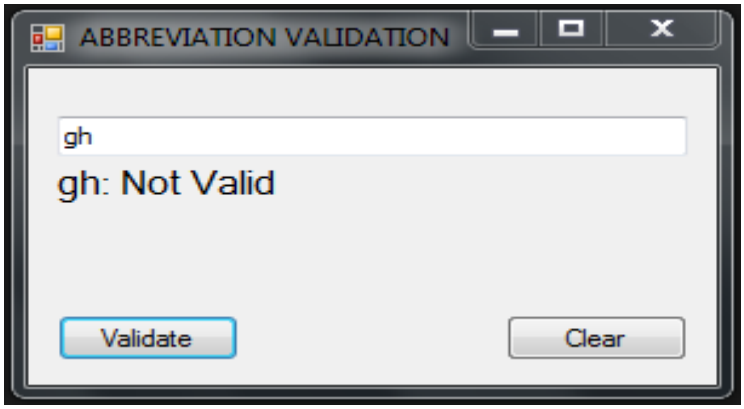
Example 1 – User entry	Example 1 – User entry
FS The program should display FS: Free State Valid	QF The program should display QF: Not Valid

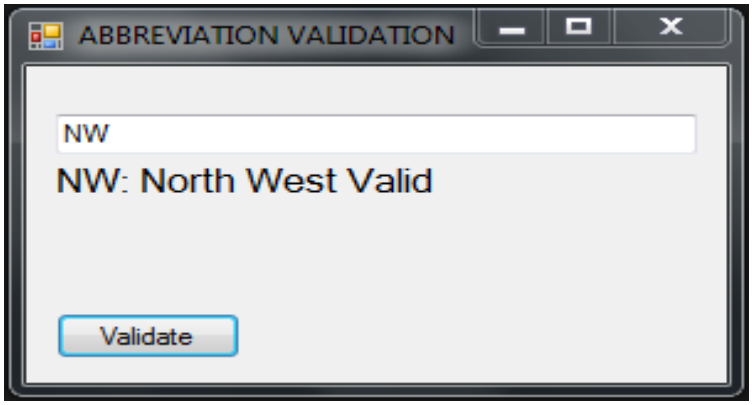
Abbreviations	Provinces
FS	Free State
GP	Gauteng
KZN	KwaZulu Natal
WC	Western Cape
EC	Eastern Cape
NC	Northern Cape
NW	North West
LP	Limpopo

Answer:

Program screenshots







Code screenshots

```
Private Sub Form1_Load(sender As Object, e As EventArgs) Handles MyBase.Load
    Dim prompt As String = String.Empty
    Dim title As String = String.Empty
    Dim defaultResponse As String = String.Empty

    Dim answer As Object
    prompt = "Enter Abbreviation"
    title = "User-Input"
    defaultResponse = ""

    answer = InputBox(prompt, title, defaultResponse)
    TextBox1.Text = answer
End Sub
```

```
Private Sub Button1_Click(sender As Object, e As EventArgs) Handles Button1.Click
    Dim Province As String

    Province = UCase(TextBox1.Text)
    If TextBox1.Text <> "" Then
        Select Case Province
            Case "NW"
                Label1.Text = "NW: North West Valid"
            Case "WC"
                Label1.Text = "WC: Western Cape Valid"
            Case "EC"
                Label1.Text = "EC: Eastern Cape Valid"
            Case "FS"
                Label1.Text = "FS: Free State Valid"
            Case "KZN"
                Label1.Text = "KZN: Kwa Zulu Natal"
            Case "GP"
                Label1.Text = "GP: Gauteng Province Valid"
            Case "MP"
                Label1.Text = "MP: Mpumalang Province Valid"
            Case "NC"
                Label1.Text = "NC: Northern Cape Valid"
            Case "LP"
                Label1.Text = "LP: Limpopo Province Valid"
            Case Else
                Label1.Text = (TextBox1.Text) & ": Not Valid"
        End Select
    End If

End Sub
```