1) What will be printed by the following codes?

a) (5 Points)

```
Sub Main()
    Dim a, b, c, x As Double
    a = 5
    b = 8
    c = 6
    If a > c Then
        x = 1
    Else
        If b > c Then
            x = 2
        Else
            x = 3
        End If
    End If
    Console.WriteLine(x)
End Sub
```

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b) (5 Points)

```
Sub Main()
    Dim a(19) As Double
    For i As Integer = 0 To 19
        a(i) = i * i
    Next
    Console.WriteLine(a(11))
End Sub
```

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c) (10 Points)

```
Sub Main()
    Dim i, j, temp As Integer
    Dim numbers() As Integer = {2, 1, 11, 8}
    For i = 0 To numbers.GetUpperBound(0)
        For j = 0 To numbers.GetUpperBound(0)
            If numbers(i) > numbers(j) Then
                temp = numbers(j)
                numbers(j) = numbers(i)
                numbers(i) = temp
            End If
        Next
    Next
    Console.Write("New Array Numbers: ")
    For i = 0 To numbers.GetUpperBound(0)
        Console.Write(numbers(i) & " ")
    Next
End Sub
```

```
New Array Numbers: 11 8 2 1
```

d) (10 Points)

```
Sub Main()
    Dim a(19) As Integer = {4, 6, 1, -3}
    For i = 0 To a.GetUpperBound(0) - 1
        s1(a(i), a(i + 1))
    Next
    For i = 0 To a.GetUpperBound(0)
        Console.Write(a(i) & " ")
    Next
End Sub
```

```
Sub s1(ByVal x1 As Integer, ByRef x2 As Integer)
    x1 += x2
    x2 *= x1
End Sub
```

```
4 60 61 -174
```

e) (10 Points)

```
Sub Main()
    Dim i, j, k As Integer
    For i = 0 To 2
        For j = 0 To 3
            For k = 0 To 4
                If k > i Then Continue For
                Console.Write("*"
            Next
            Console.WriteLine("-")
        Next
    Next
End Sub
```

```
***--**---*---*
```

2) Assume that A, B, and C are conditions, with A being true, B being true, and C being false. What will the following conditions evaluate to? (True or False) (5 Points)

a. (Not A) And (Not C) FALSE
b. A Or (Not B) TRUE
c. A And (B Or C) TRUE
d. (A And B) Or C TRUE

3) In the line of code

```
Dim score() As Integer = {55, 33, 12}
```

Which number will be the upper bound of the array score() ? (5 Points) 2

4) Fill in the empty rectangles to illustrate the progressing status of examGrades() after the execution of each segment: (10 Points)

```
Dim examGrades(4) As Double
examGrades() = 0.0 0.0 0.0 0.0 0.0
examGrades(0) = 92.4
examGrades(1) = examGrades(0) + 2
examGrades() = 92.4 94.4 0.0 0.0 0.0
For i As Integer = 2 to 4
    examGrades(i) = examGrades(i-1) + 2
Next
examGrades() = 92.4 94.4 96.4 98.4 100.4
```

5) Write a program to generate totally 100 random integer numbers ranging from 1 to 10. These numbers should be stored in array and after that these values should be evaluated to find their frequencies and the related string values that will be used in the bar chart. The output window should look like the one at right. (20 points)

```
Sub Main()
    Dim randomsayı(0 To 100) As Integer
    Dim frekans(0 To 10) As Integer
    Dim histogram(0 To 10) As String
    Dim i, j As Integer
    Dim randomobject As New Random()
    For i = 1 To 100
        randomsayı(i) = 1 + randomobject.Next(10)
    Next i
    For i = 1 To 10
        For j = 1 To 100
            If randomsayı(j) = i Then
                frekans(i) = frekans(i) + 1
                histogram(i) = histogram(i) & "*
            End If
        Next j
    Next i
    Console.WriteLine("Number" & vbTab & "Freq" & vbTab & "Bar Chart")
    For i = 1 To 10
        Console.WriteLine(i & vbTab & frekans(i) & vbTab & histogram(i))
    Next i
End Sub
```
6) Write a program that calculates exponential and cosine values according to the given series below. Both the sine and cosine calculations should be written in a separate function (10 loops will be enough to obtain the approximate results). Also the factorials must be calculated in a recursive function. Inside the main subroutine you must calculate the exponential and cosine of \( x \) by calling their functions where degree \( x \) values will be in range from 0 to 45 degrees and will increment by 5 degrees. But Taylor series are constructed to work with radian values, so don’t forget to use radian values where \( \pi \) value equals to 180 degrees. (You can use \texttt{math.pi} instead of 22/7). So you should find 10 sine and cosine values. These values should be stored in two separate arrays. After that you should calculate the \( g(x) \) values that will be stored in the 3\textsuperscript{rd} array. Now you can print the results on the console window as shown right below. (Do not forget to round decimal values to 3 for the output).

(20 points)

Sub Main()
    Dim array1(9) As Single
    Dim array2(9) As Single
    Dim array3(9) As Single
    Dim j As Integer
    For i = 0 To Math.PI / 4 Step Math.PI / 36
        array1(j) = expo(i)
        array2(j) = cosine(i)
        array3(j) = expo(i) / cosine(i)
        Console.Write("e (" & j * 5 & ")= " & Math.Round(array1(j), 3) & vbTab)
        Console.Write("cos (" & j * 5 & ")= " & Math.Round(array2(j), 3) & vbTab)
        Console.WriteLine("g (" & j * 5 & ")= " & Math.Round(array3(j), 3))
        j += 1
    Next
End Sub

Function expo(ByVal x As Single) As Single
    For i = 0 To 10
        expo += (x ^ i / factorial(i))
    Next i
    Return expo
End Function

Function cosine(ByVal x As Single) As Single
    For i = 0 To 10
        cosine += ((-1) ^ i / factorial(2 * i)) * x ^ (2 * i)
    Next i
    Return cosine
End Function

Function factorial(ByVal number As Long) As Long
    If number <= 1 Then
        Return 1
    End If
    Return number * factorial(number - 1)
End Function