

Question 1:

```
Public Class Form1 ' Ilker Hadzhalaran

    Private Sub btnCalculate_Click(sender As Object, e As EventArgs) Handles
        btnCalculate.Click

        Dim dblPo, dblK, dblTime As Double

        dblPo = Cdbl(txtInputPo.Text)
        dblK = Cdbl(txtInputK.Text)

        If dblK < -0.08 Or dblK > 0.08 Then
            MsgBox("The k value must be: -0.08 <= k <= 0.08")
            Exit Sub

        ElseIf dblPo <= 0 Then
            MsgBox("The P value must be greater than 0")
            Exit Sub
        End If

        If dblK > 0 Then
            lblModelType.Text = "This is a growth model"

            dblTime = GrowthModel(dblPo, dblK)

            lblDoubleOrHalfTime.Text = "The doubling time is " & (dblTime /
60).ToString("n3") & " min"

        Else
            lblModelType.Text = "This is a decay model"

            dblTime = DecayModel(dblPo, dblK)

            lblDoubleOrHalfTime.Text = "The half life time is " & (dblTime /
60).ToString("n3") & " min"

        End If

    End Sub

    Private Function GrowthModel(ByVal dblPo As Double, ByVal dblK As Double) As Double

        Dim dblTime As Double

        dblTime = (Math.Log(2)) / dblK
        Return dblTime

    End Function
```

```
Private Function DecayModel(ByVal dblPo As Double, ByVal dblK As Double) As Double

    Dim dblTime As Double

    dblTime = (Math.Log(0.5)) / dblK
    Return dblTime

End Function

Private Sub btnClear_Click(sender As Object, e As EventArgs) Handles btnClear.Click
    lblDoubleOrHalfTime.Text = String.Empty
    lblModelType.Text = String.Empty
    txtInputPo.Clear()
    txtInputK.Clear()

End Sub

Private Sub btnExit_Click(sender As Object, e As EventArgs) Handles btnExit.Click
    Me.Close()
End Sub
End Class
```

Form1

Enter a P value at t=0 sec, and a k value:

This is a growth model

The doubling time is 0.193 min

Form1

Enter a P value at t=0 sec, and a k value:

This is a decay model

The half life time is 0.289 min

Form1

Enter a P value at t=0 sec, and a k value:

Assignment2\_Application1

The k value must be:  $-0.08 \leq k \leq 0.08$

Form1

Enter a P value at t=0 sec, and a k value:

5 0.081

Calculate Clear Exit

Assignment2\_Application1

The k value must be:  $-0.08 \leq k \leq 0.08$

OK

Form1

Enter a P value at t=0 sec, and a k value:

-1 0.08

Calculate Clear Exit

Assignment2\_Application1

The P value must be greater than 0

OK

## Question 2:

```
Public Class Form1 ' Ilker Hadzhalaran

    Private Sub btnCalculate_Click(sender As Object, e As EventArgs) Handles
        btnCalculate.Click

        Dim dblDiameter, dblHeight, dblDepth, dblSheetThickness, dblSheetWidth,
        dblVolume, dblForce, dblWorkAtHeight, dblTotalWork As Double
        Dim intN As Integer

        dblDiameter = CDb1(txtInputDiameter.Text)
        dblHeight = CDb1(txtInputHeight.Text)
        dblDepth = CDb1(txtInputDepth.Text)
        dblSheetThickness = CDb1(txtInputSheetThickness.Text)

        If dblHeight < dblDepth Or dblDepth < dblSheetThickness Then
            MsgBox("Height of the tank must be greater than depth of oil, and the depth
of oil must be larger than and a multiple of the sheet thickness.")
            Exit Sub

        End If

        lblDiameter.Text = "Diameter (m): " & dblDiameter.ToString("N3")
        lblHeight.Text = "Height (m): " & dblHeight.ToString("N3")
        lblDepth.Text = "Depth (m): " & dblDepth.ToString("N3")
        lblSheetThickness.Text = "Sheet Thickness (m): " &
        dblSheetThickness.ToString("N3")

        dblSheetWidth = dblDepth * dblDiameter / dblHeight

        dblVolume = CalculateVolume(dblSheetWidth, dblSheetThickness)

        dblForce = CalculateForce(dblVolume)

        dblWorkAtHeight = CalculateWorkAtHeight(dblForce, dblDepth)

        dblTotalWork = 0
        intN = CInt(dblDepth / dblSheetThickness)

        For intCounter As Integer = 1 To intN Step 1

            dblTotalWork += dblWorkAtHeight

        Next intCounter

        lblTotalWork.Text = "Total Work (N): " & dblTotalWork.ToString("N3")

    End Sub

    Private Function CalculateVolume(ByVal dblSheetWidth As Double, ByVal
        dblSheetThickness As Double) As Double
        Dim dblVolume As Double
```

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dblVolume = (Math.PI) * (dblSheetWidth / 2) ^ 2 * (dblSheetThickness)
Return dblVolume
```

End Function

```
Private Function CalculateForce(ByVal dblVolume As Double) As Double
    Const GRAVITY As Double = 9.8 'in m/s^2
    Const DENSITY As Double = 2000 'in kg/m^3
    Dim dblForce As Double
```

```
    dblForce = DENSITY * GRAVITY * dblVolume
    Return dblForce
```

End Function

```
Private Function CalculateWorkAtHeight(ByVal dblForce As Double, ByVal dblDepth As
Double) As Double
```

```
    Dim dblWorkAtHeight As Double
```

```
    dblWorkAtHeight = dblForce * (20 - dblDepth)
    Return dblWorkAtHeight
```

End Function

```
Private Sub btnClear_Click(sender As Object, e As EventArgs) Handles btnClear.Click
    lblDepth.Text = String.Empty
    lblDiameter.Text = String.Empty
    lblHeight.Text = String.Empty
    lblSheetThickness.Text = String.Empty
    lblTotalWork.Text = String.Empty

    txtInputDepth.Clear()
    txtInputDiameter.Clear()
    txtInputHeight.Clear()
    txtInputSheetThickness.Clear()
```

End Sub

```
Private Sub btnExit_Click(sender As Object, e As EventArgs) Handles btnExit.Click
    Me.Close()
End Sub
```

End Class

Form1

Input diameter of conical tank (m) , height of tank (m), depth of oil in tank (m), thickness of oil sheet (m):

4 2 6 2

Calculate Total Work Clear Exit

Assignment2\_Application2

Height of the tank must be greater than depth of oil, and the depth of oil must be larger than and a multiple of the sheet thickness.

OK

Form1

Input diameter of conical tank (m) , height of tank (m), depth of oil in tank (m), thickness of oil sheet (m):

20 10 5 1

Diameter (m): 20.000  
Height (m): 10.000  
Depth (m): 5.000  
Sheet Thickness (m): 1.000  
Total Work (N): 115,453,530.019

Calculate Total Work Clear Exit

Form1

Input diameter of conical tank (m) , height of tank (m), depth of oil in tank (m), thickness of oil sheet (m):

Form1

Input diameter of conical tank (m) , height of tank (m), depth of oil in tank (m), thickness of oil sheet (m):

Diameter (m): 30.000  
Height (m): 20.000  
Depth (m): 10.000  
Sheet Thickness (m): 2.000  
Total Work (N): 346,360,590.058