

جامعة دمشق
كلية الهندسة المدنية

مادة البرمجة
السنة الثالثة
المحاضرة 4

3/5/2023

Wael Darwich

1

Content

- Condition Syntax
 - If / End If
 - Then
 - Else
 - Elself
- Examples
 - Section Properties
 - Equation Solver
 - Previous Exam
 - Input Validation
 - Electricity Tariff
- Loops

2

If Syntax

```
If condition1 Then  
    code1  
End If
```

```
If condition2 Then  
    code2  
End If
```

3

If Syntax

```
If condition1 Then  
    code1  
    If condition2 Then  
        code2  
    End If  
End If
```

4

Single Line

```
If condition1 Then code1
```

No need for `End If`

Any command after `Then`

If Syntax

```
If condition1 Then  
    code1 ' True  
Else  
    code2 ' False  
End If
```

If Syntax

```
If condition1 Then
    code1 ' Con1
ElseIf condition2 Then
    code2 ' Con2 and not Con1
ElseIf condition3 Then
    code3 ' Con3 and not Con1 and not Con2
Else
    code4 ' Last one
End If
```

If Syntax

```
If condition1 Then
    code1
End If

If condition2 Then
    code2
End If
```

If Syntax

1. `If` condition1 `Then`
2. `ElseIf` any number ≤ 0
3. `Else` optional
4. `End If`
5. Exact order

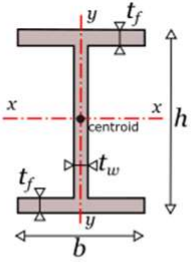
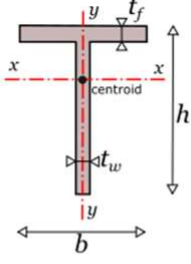
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9

9

Example: Section Properties

	
$A = 2 b \cdot t_f + (h - 2 \cdot t_f) \cdot t_w$ $I_y = \frac{(h - 2t_f)t_w^3}{12} + 2 \frac{t_f b^3}{12}$	$A = b \cdot t_f + (h - t_f) \cdot t_w$ $I_y = \frac{(h - t_f)t_w^3}{12} + \frac{t_f b^3}{12}$

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10

10

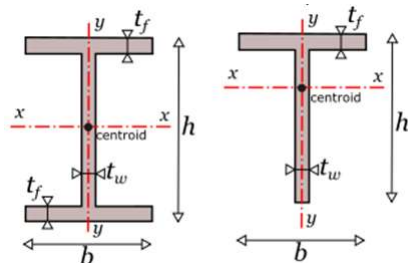
Example: Section Properties

```
Imports System.Console
Imports System.Math

Module section
  Sub main()

    Dim b, h, tf, tw, A, type As Integer
    Dim Iy As Double

    End Sub
End Module
```



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11

11

Example: Section Properties

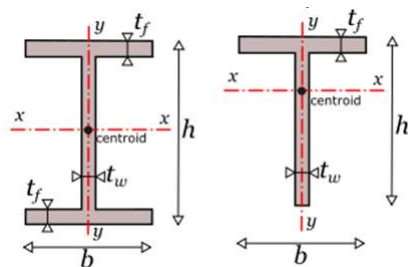
```
WriteLine("Enter section type (I=1/T=2)")
type = ReadLine()

WriteLine("Enter tf (mm)")
tf = ReadLine()

WriteLine("Enter tw (mm)")
tw = ReadLine()

WriteLine("Enter b (mm)")
b = ReadLine()

WriteLine("Enter h (mm)")
h = ReadLine()
```



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12

12

Example: Section Properties

```

If (type = 1) Then
  A = 2 * tf * b + (h - 2 * tf) * tw
  Iy = 2 * tf * b ^ 3 / 12 + (h - 2 * tf) * tw ^ 3 / 12
ElseIf (type = 2) Then
  A = tf * b + (h - tf) * tw
  Iy = tf * b ^ 3 / 12 + (h - tf) * tw ^ 3 / 12
End If

WriteLine("Area = " & A & " mm2")
WriteLine("Iy = " & Round(Iy, 2) & " mm4")

```

$$A = 2 \cdot b \cdot t_f + (h - 2 \cdot t_f) \cdot t_w$$

$$I_y = \frac{(h - 2t_f)t_w^3}{12} + 2 \frac{t_f b^3}{12}$$

$$A = b \cdot t_f + (h - t_f) \cdot t_w$$

$$I_y = \frac{(h - t_f)t_w^3}{12} + \frac{t_f b^3}{12}$$

Example: Equation Solver

- Quadratic (second order) equations:

$$A \cdot x^2 + B \cdot x + C = 0$$

- Inputs:

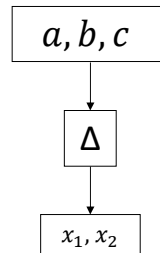
- A, B, C

- Outputs:

- X_1, X_2

Quadratic Equations

$$a \cdot x^2 + b \cdot x + c = 0$$



Quadratic Equations

$$a \cdot x^2 + b \cdot x + c = 0$$

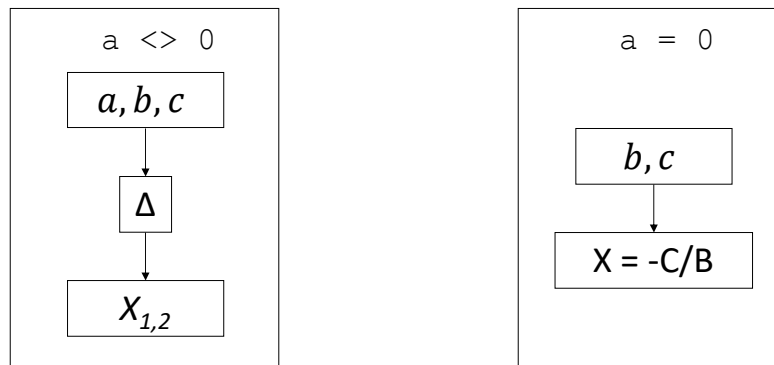
$$x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2 \cdot a}$$

$$a = 0$$

$$x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{0}$$

Quadratic Equations

$$a \cdot x^2 + b \cdot x + c = 0$$



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17

17

Error Check

$$a \cdot x^2 + b \cdot x + c = 0$$

$$a = 0$$

$$b = 0$$

No solution!

Input validation

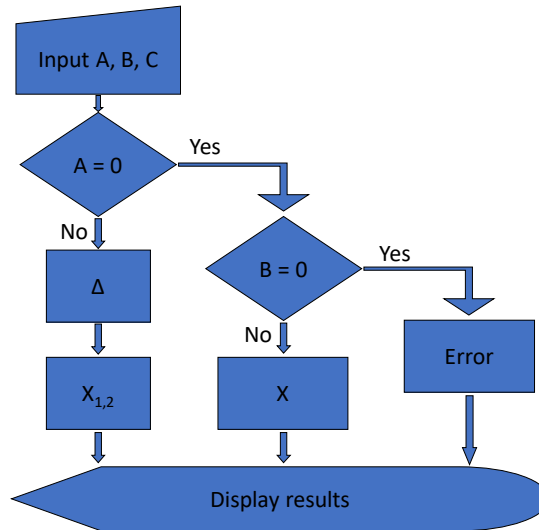
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18

18

Flowchart



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19

19

```

Imports System.Console
Imports System.Math

Module Program

    Sub QuadraticEquationRoots(a As Double, b As Double, c As Double)
        ' Solve second order equation a x^2 + b x + c = 0

    End Sub

    Sub main()
        ' Solve quadratic equations
        QuadraticEquationRoots(1, 0, -4)
    End Sub

End Module
  
```

20

```

If a = 0 Then
  If b = 0 Then ' Regardless of c
    WriteLine("Error: This equation is degenerate!")
  Else
    WriteLine("There is a single root = " & Round(-c / b, 3))
  End If
Else
  Dim delta As Double = b ^ 2 - 4 * a * c
  If delta >= 0 Then
    Dim x1, x2, delta2 As Double
    delta2 = Sqrt(delta)
    x1 = (-b + delta2) / (2 * a)
    x2 = (-b - delta2) / (2 * a)
    WriteLine("There are 2 roots x1=" & Round(x1, 3) & " x2=" & Round(x2, 3))
  Else
    WriteLine("There are 2 imaginary roots for this equation")
  End If
End If

```

21

```

If a = 0 Then
  If b = 0 Then ' Regardless of c
    WriteLine("Error: This equation is degenerate!")
  Else
    WriteLine("There is a single root = " & Round(-c / b, 3))
  End If
Else
  Dim delta As Double = b ^ 2 - 4 * a * c
  If delta >= 0 Then
    Dim x1, x2, delta2 As Double
    delta2 = Sqrt(delta)
    x1 = (-b + delta2) / (2 * a)
    x2 = (-b - delta2) / (2 * a)
    WriteLine("There are 2 roots x1=" & Round(x1, 3) & " x2=" & Round(x2, 3))
  Else
    WriteLine("There are 2 imaginary roots for this equation")
  End If
End If

```

22

```

Imports System.Console
Imports System.Math
Module Program
Sub QuadraticEquationRoots(a As Double, b As Double, c As Double)
' Solve second order equation a x^2 + b x + c = 0
If a = 0 Then
If b = 0 Then ' Regardless of c
WriteLine("Error: This equation is degenerate!")
Else
WriteLine("There is a single root = " & Round(-c / b, 3))
End If
Else
Dim delta As Double = b ^ 2 - 4 * a * c
If delta >= 0 Then
Dim x1, x2, delta2 As Double
delta2 = Sqrt(delta)
x1 = (-b + delta2) / (2 * a)
x2 = (-b - delta2) / (2 * a)
WriteLine("There are 2 roots x1=" & Round(x1, 3) & " x2=" & Round(x2, 3))
Else
WriteLine("There are 2 imaginary roots for this equation")
End If
End If
End Sub
Sub main()
' Solve quadratic equations
QuadraticEquationRoots(0, 0, 0)
QuadraticEquationRoots(0, 1, -4)
QuadraticEquationRoots(1, 0, -4)
QuadraticEquationRoots(1, 0, 4)
End Sub
End Module

```

23

```

Sub main()
' Solve quadratic equations
QuadraticEquationRoots(0, 0, 0)
QuadraticEquationRoots(0, 1, -4)
QuadraticEquationRoots(1, 0, -4)
QuadraticEquationRoots(1, 0, 4)
End Sub

```

```

Microsoft Visual Studio Debug Console
Error: This equation is degenerate!
There is a single root = 4
There are 2 roots x1=2 x2=-2
There are 2 imaginary roots for this equation

```

24

Example: Previous Exam

```
Dim X, Y As Double
WriteLine("Enter X then Y:")
X = ReadLine()
Y = ReadLine()
```

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موقع نقطة $P(x, y)$ ضمن جملة
احداثيات ديكارتية

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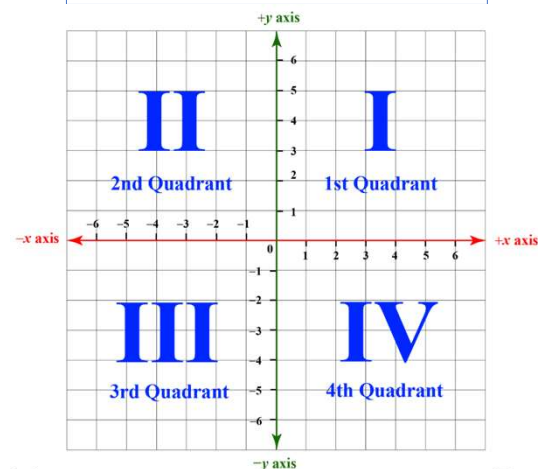
25

25

Example: Previous Exam

```
If X = 0 And Y = 0 Then
    WriteLine("origin point")
ElseIf X = 0 Then
    WriteLine("on axis Y")
ElseIf Y = 0 Then
    WriteLine("on axis X")
ElseIf X > 0 And Y > 0 Then
    WriteLine("in 1st quarter")
ElseIf X < 0 And Y > 0 Then
    WriteLine("in 2nd quarter")
ElseIf X < 0 And Y < 0 Then
    WriteLine("in 3rd quarter")
Else
    WriteLine("in 4th quarter")
End If
```

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موقع نقطة $P(x, y)$ ضمن جملة
احداثيات ديكارتية



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26

26

Example: Previous Exam

```

If X = 0 And Y = 0 Then
  WriteLine("origin point")
ElseIf X = 0 Then
  WriteLine("on axis Y")
ElseIf Y = 0 Then
  WriteLine("on axis X")
ElseIf X > 0 And Y > 0 Then
  WriteLine("in 1st quarter")
ElseIf X < 0 And Y > 0 Then
  WriteLine("in 2nd quarter")
ElseIf X < 0 And Y < 0 Then
  WriteLine("in 3rd quarter")
Else
  WriteLine("in 4th quarter")
End If

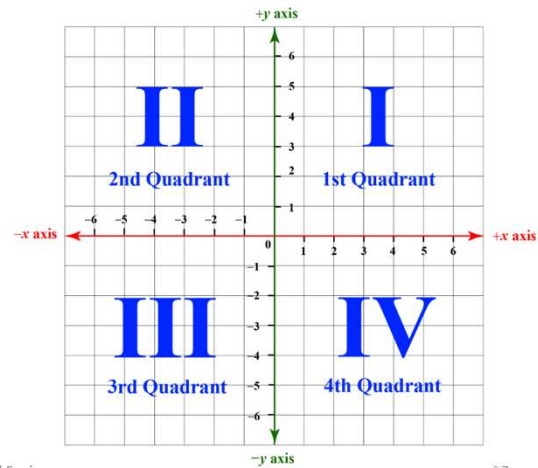
```

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27

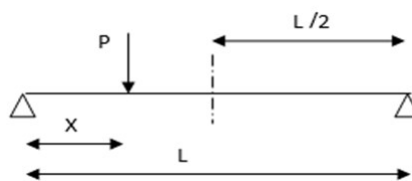
اكتب برنامج بلغة VB.Net لتحديد
موقع نقطة $P(x, y)$ ضمن جملة
احداثيات ديكارتية



27

Input Validation

- For the beam shown below, write VB subroutine to calculate shear force and bending moment in the middle



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28

28

Input Validation

```

Dim P, L, X, RR, M, Q As Double
WriteLine("Enter the length of the beam [m] ")
L = ReadLine()
WriteLine("Enter the load value [N] ")
P = ReadLine()
WriteLine("Enter the load distance from the left [m] ")
X = ReadLine()
RR = P * X / L

If (X < L / 2) Then
    M = RR * L / 2
    Q = RR
Else
    M = RR * L / 2 - P * (X - L / 2)
    Q = RR - P
End If

WriteLine("Bending Moment = " & Round(M, 2) & " N.m")
WriteLine("Shear Force = " & Round(Q, 2) & " N")

```

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29

29

Input Validation

```

Dim P, L, X, RR, M, Q As Double
WriteLine("Enter the length of the beam [m] ")
L = ReadLine()
WriteLine("Enter the load value [N] ")
P = ReadLine()
WriteLine("Enter the load distance from the left [m] ")
X = ReadLine()

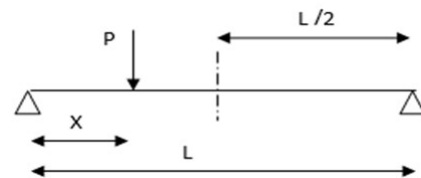
If (L <= 0 Or X < 0 Or X > L) Then
    WriteLine("Input Error!")
Else

    RR = P * X / L
    If (X < L / 2) Then

    End If

End If

```



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30

30

Example: Electricity Tariff

التعرفة:

من ١ إلى ٦٠٠ بسعر ٢ ل.ب، من ٦٠١ إلى ١٠٠٠ بسعر ٦ ل.ب، من ١٠٠١ إلى ١٥٠٠ بسعر ٢٠ ل.ب، من ١٥٠١ إلى ٢٥٠٠ بسعر ٩٠ ل.ب، من ٢٥٠١ فما فوق بسعر ١٥٠ ل.ب لكل ك.وس

```
Function tariff(kwh As Integer) As Integer
    Dim result As Integer

    Return result
End Function
```

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31

31

Example: Electricity Tariff

التعرفة:

من ١ إلى ٦٠٠ بسعر ٢ ل.ب، من ٦٠١ إلى ١٠٠٠ بسعر ٦ ل.ب، من ١٠٠١ إلى ١٥٠٠ بسعر ٢٠ ل.ب، من ١٥٠١ إلى ٢٥٠٠ بسعر ٩٠ ل.ب، من ٢٥٠١ فما فوق بسعر ١٥٠ ل.ب لكل ك.وس

```
If kwh < 1 Then
    result = 0
ElseIf kwh <= 600 Then
    result = kwh * 2
ElseIf kwh <= 1000 Then
    result = 600 * 2 + (kwh - 600) * 6
ElseIf kwh <= 1500 Then
    result = 600 * 2 + 400 * 6 + (kwh - 1000) * 20
ElseIf kwh <= 2500 Then
    result = 600 * 2 + 400 * 6 + 500 * 20 + (kwh - 1500) * 90
Else
    result = 600 * 2 + 400 * 6 + 500 * 20 + 1000 * 90 + (kwh - 2500) * 150
End If
```

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32

32

Example: Electricity Tariff

التعرفة:

من ١ إلى ٦ بـ ٢ ل.ب، من ٦.١ إلى ١٠٠٠ بـ ٦ ل.ب، من ١٠٠١ إلى ١٥٠٠ بـ ٢٠ ل.ب، من ١٥٠١ إلى ٢٥٠٠ بـ ٩٠ ل.ب، من ٢٥٠١ فما فوق بـ ١٥٠ ل.ب لكل ك.وس

```
Sub main()
  WriteLine("Cost of 100 kwh is " & tariff(100))
  WriteLine("Cost of 1000 kwh is " & tariff(1000))
  WriteLine("Cost of 1100 kwh is " & tariff(1100))
End Sub
```

```
Microsoft Visual Studi x + - □ x
Cost of 100 kwh is 200
Cost of 1000 kwh is 3600
Cost of 1100 kwh is 5600
```

Example: Electricity Tariff

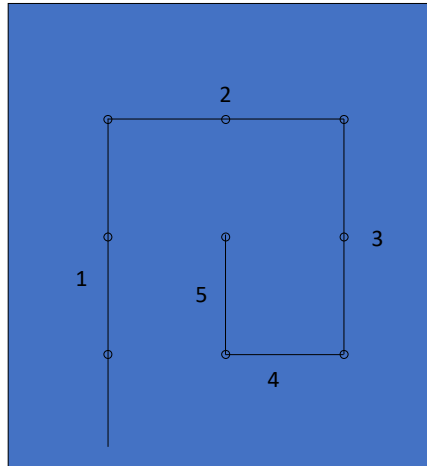
التعرفة:

من ١ إلى ٦ بـ ٢ ل.ب، من ٦.١ إلى ١٠٠٠ بـ ٦ ل.ب، من ١٠٠١ إلى ١٥٠٠ بـ ٢٠ ل.ب، من ١٥٠١ إلى ٢٥٠٠ بـ ٩٠ ل.ب، من ٢٥٠١ فما فوق بـ ١٥٠ ل.ب لكل ك.وس

<code>If kwh < 1 Then</code>	<code>If kwh > 1 Then</code>	<code>If kwh > 2500 Then</code>
<code>ElseIf kwh <= 600 Then</code>	<code>ElseIf kwh > 600 Then</code>	<code>ElseIf kwh > 1500 Then</code>
<code>ElseIf kwh <= 1000 Then</code>	<code>ElseIf kwh > 1000 Then</code>	<code>ElseIf kwh > 1000 Then</code>
<code>ElseIf kwh <= 1500 Then</code>	<code>ElseIf kwh > 1500 Then</code>	<code>ElseIf kwh > 600 Then</code>
<code>ElseIf kwh <= 2500 Then</code>	<code>ElseIf kwh > 2500 Then</code>	<code>ElseIf kwh > 1 Then</code>
<code>Else</code>	<code>Else</code>	<code>Else</code>
<code>End If</code>	<code>End If</code>	<code>End If</code>

Line Puzzle

Connect all nine dots with five straight lines without lifting up your pen.
 Connect all nine dots with FOUR straight lines without lifting up your pen



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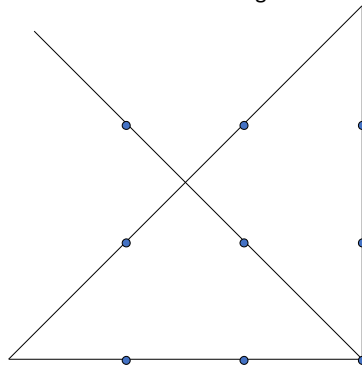
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35

35

Line Puzzle

Connect all nine dots with FOUR straight lines without lifting your pencil



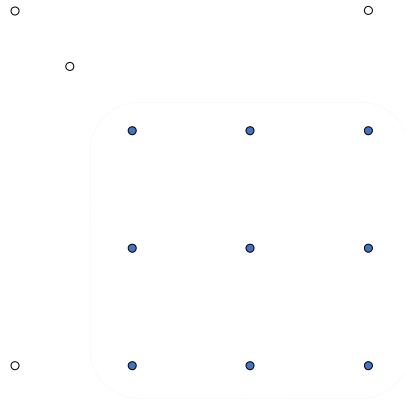
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36

36

Line Puzzle



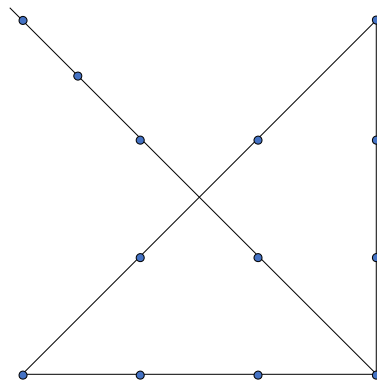
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37

37

Line Puzzle



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38

38

Bottle Problem

- Half full / half empty?
- Calculate volume
- Iterations
 - Loop



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39