Visual Basic for Applications

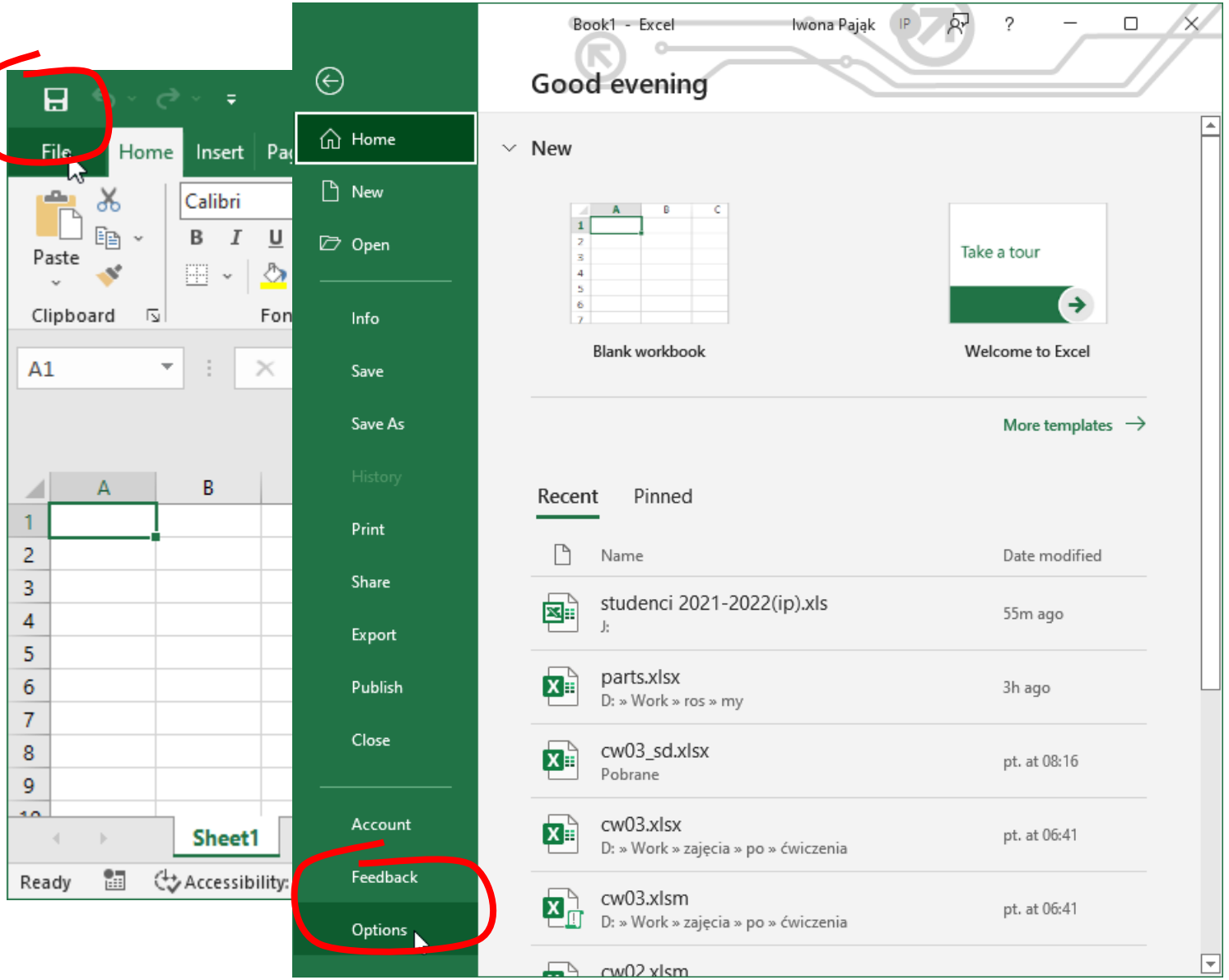
Introduction to programming

VBA Excel

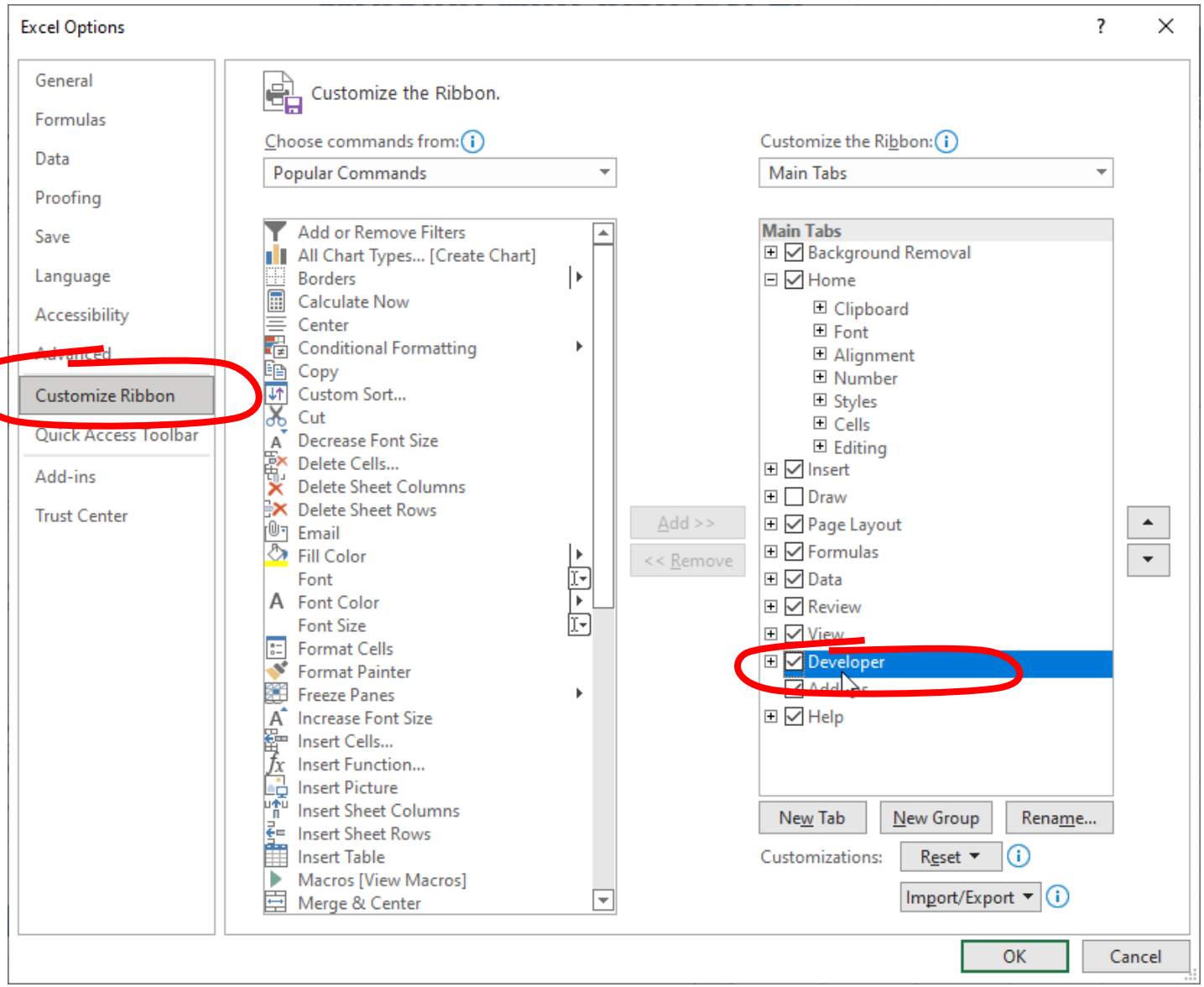
Materials
http://staff.uz.zgora.pl/ipajak
http://staff.uz.zgora.pl/gpajak

Developer Ribbon

Working with VBA Excel

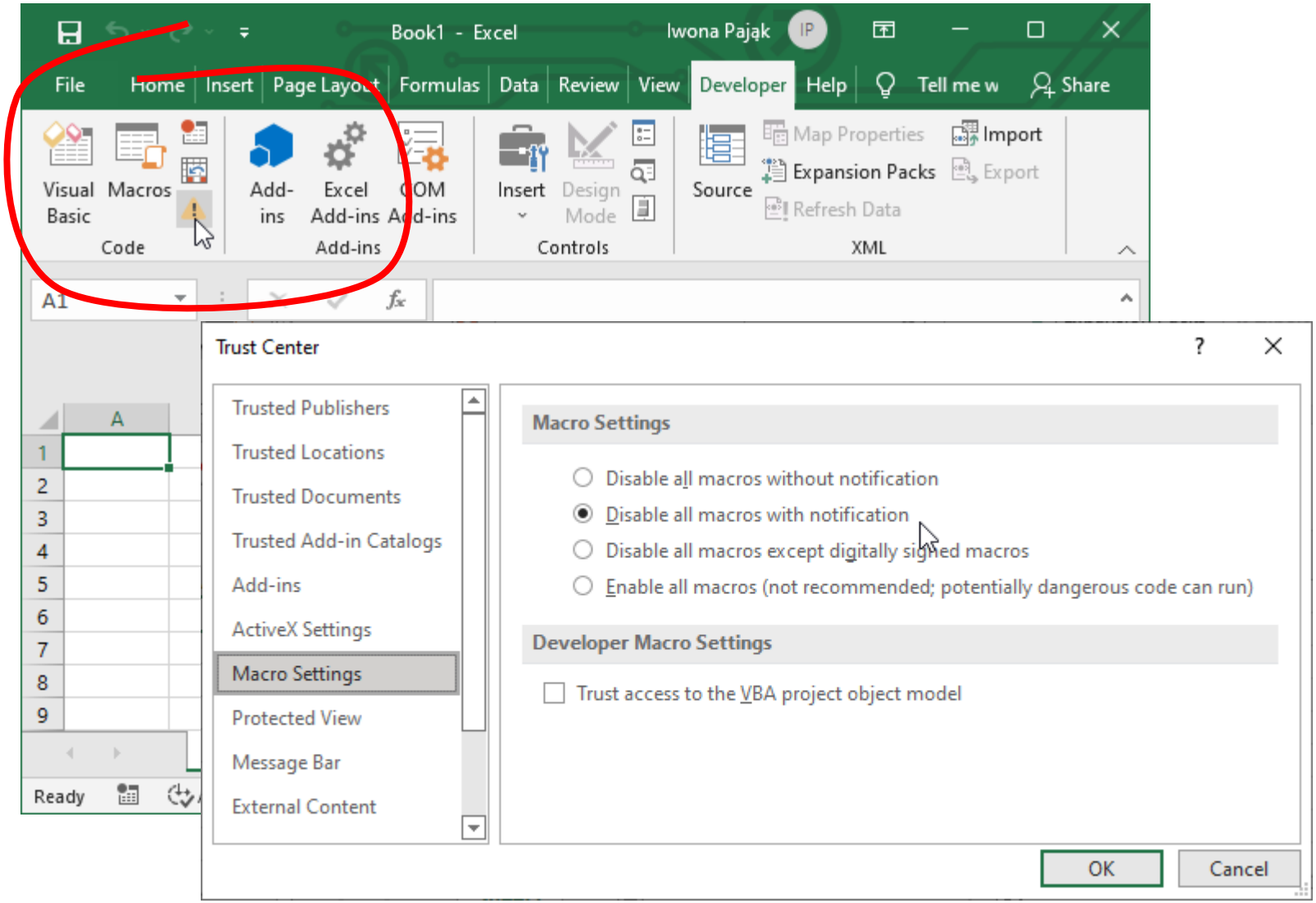


Working with VBA Excel



Safety

Working with VBA Excel



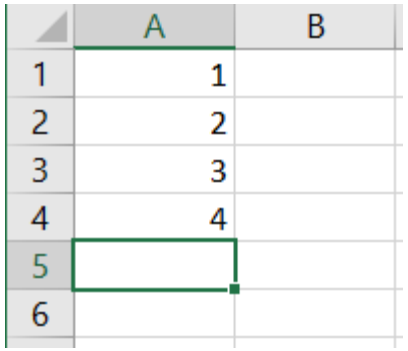
Macro List1

First macro – macro List1

Assumptions

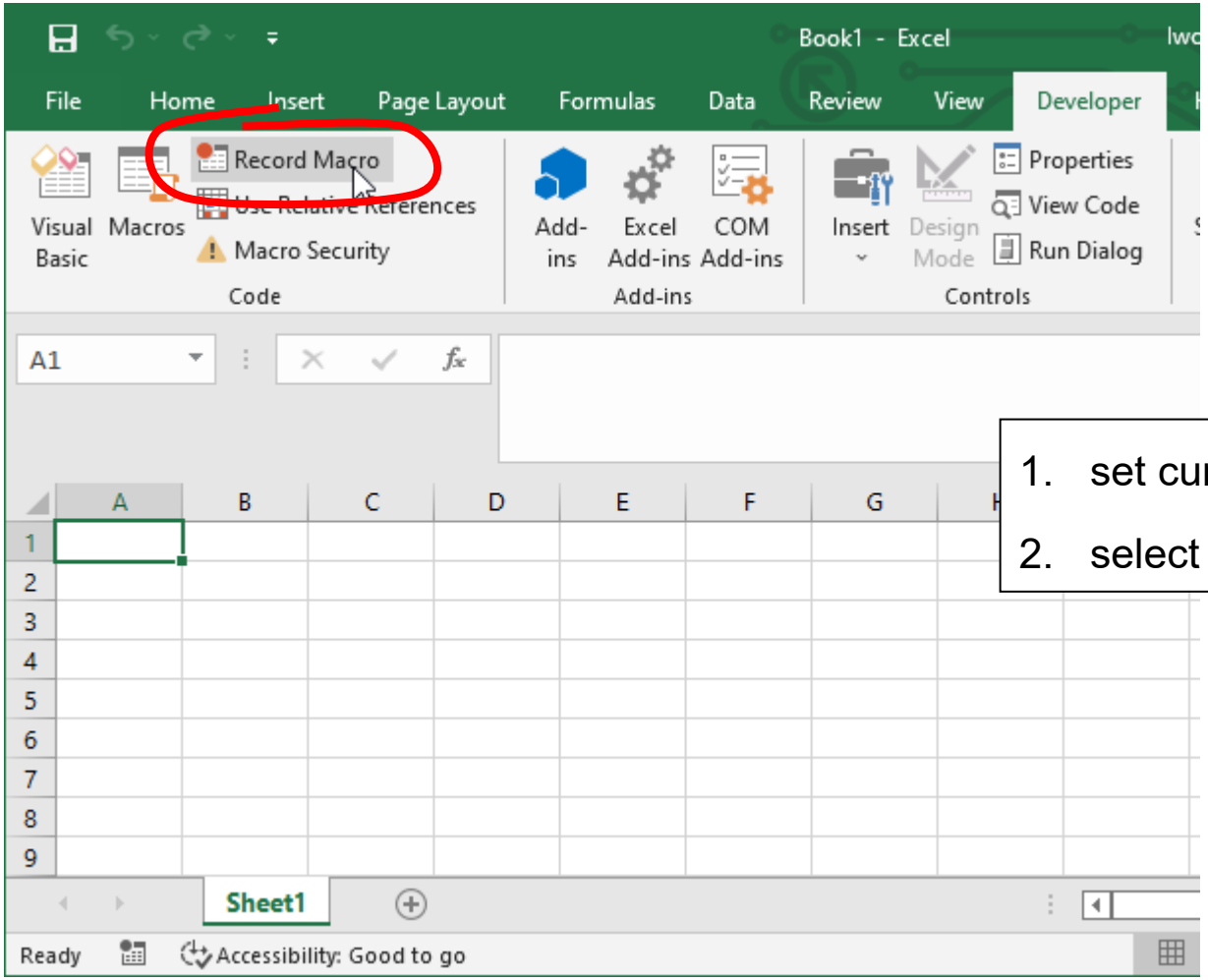
macro writes down:

- digit 1 in cell A1
- digit 2 in cell A2
- digit 3 in cell A3
- digit 4 in cell A4



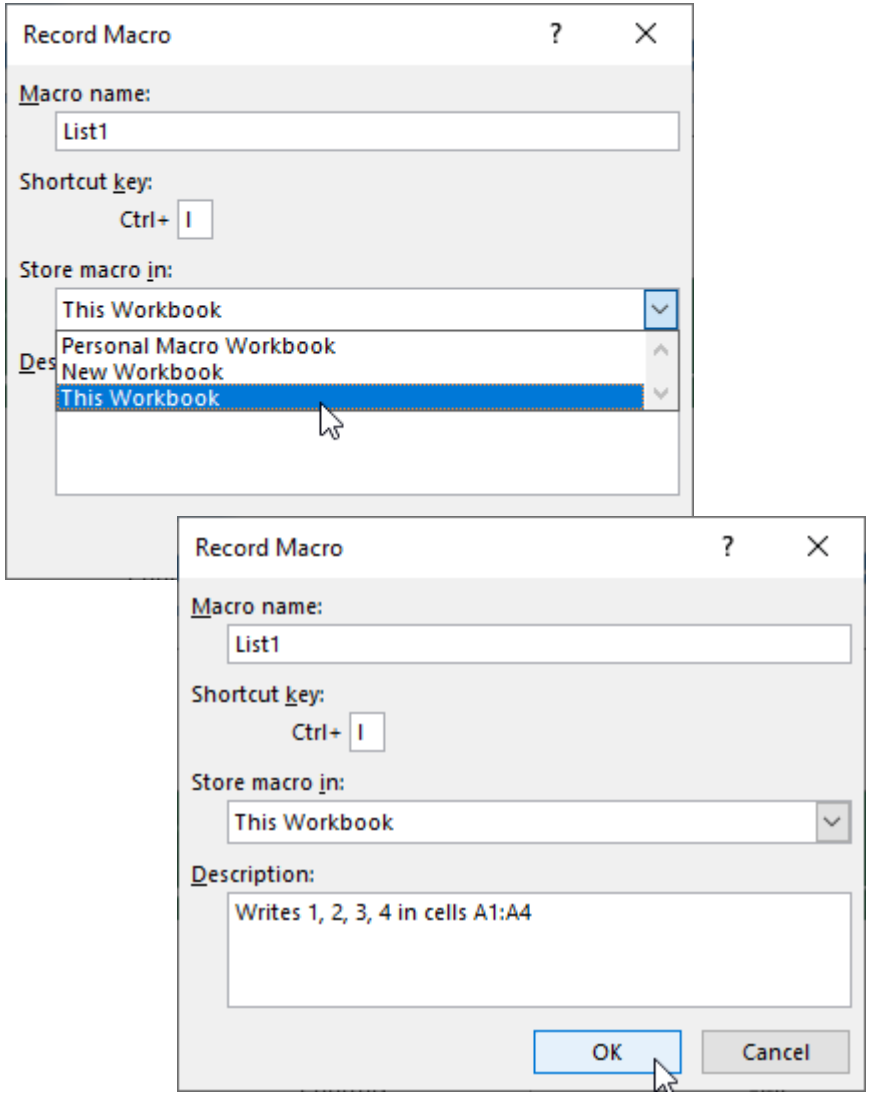
	A	B
1	1	
2	2	
3	3	
4	4	
5		
6		

Recording macro – macro List1



1. set cursor in cell A1
2. select Record Macro

Recording macro – macro List1



3. set macro name

   here: List1

4. optionally set shortkut key

   here: Ctrl+l

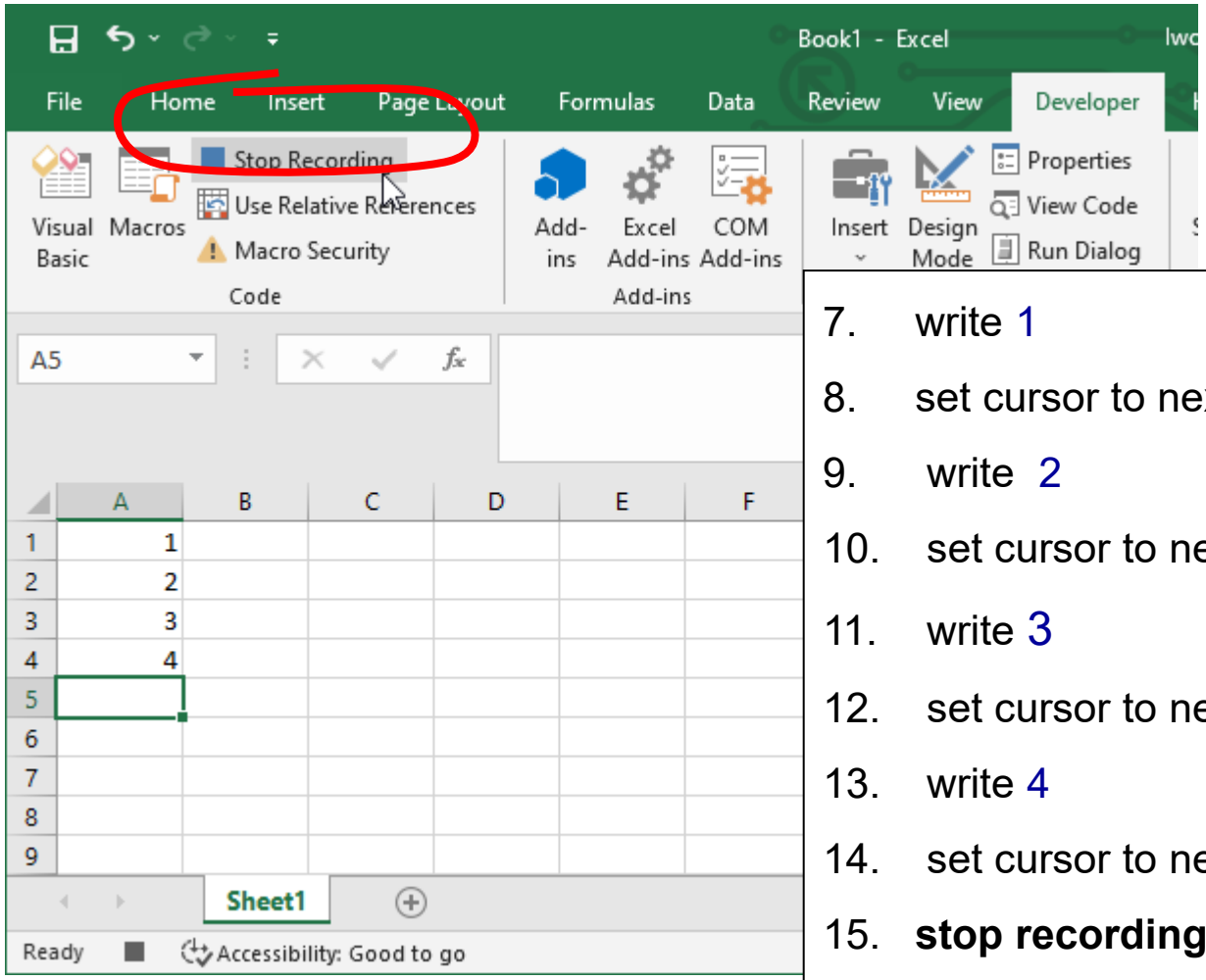
5. set where macro will be stored

   here*: This workbook*

6. optionally add description

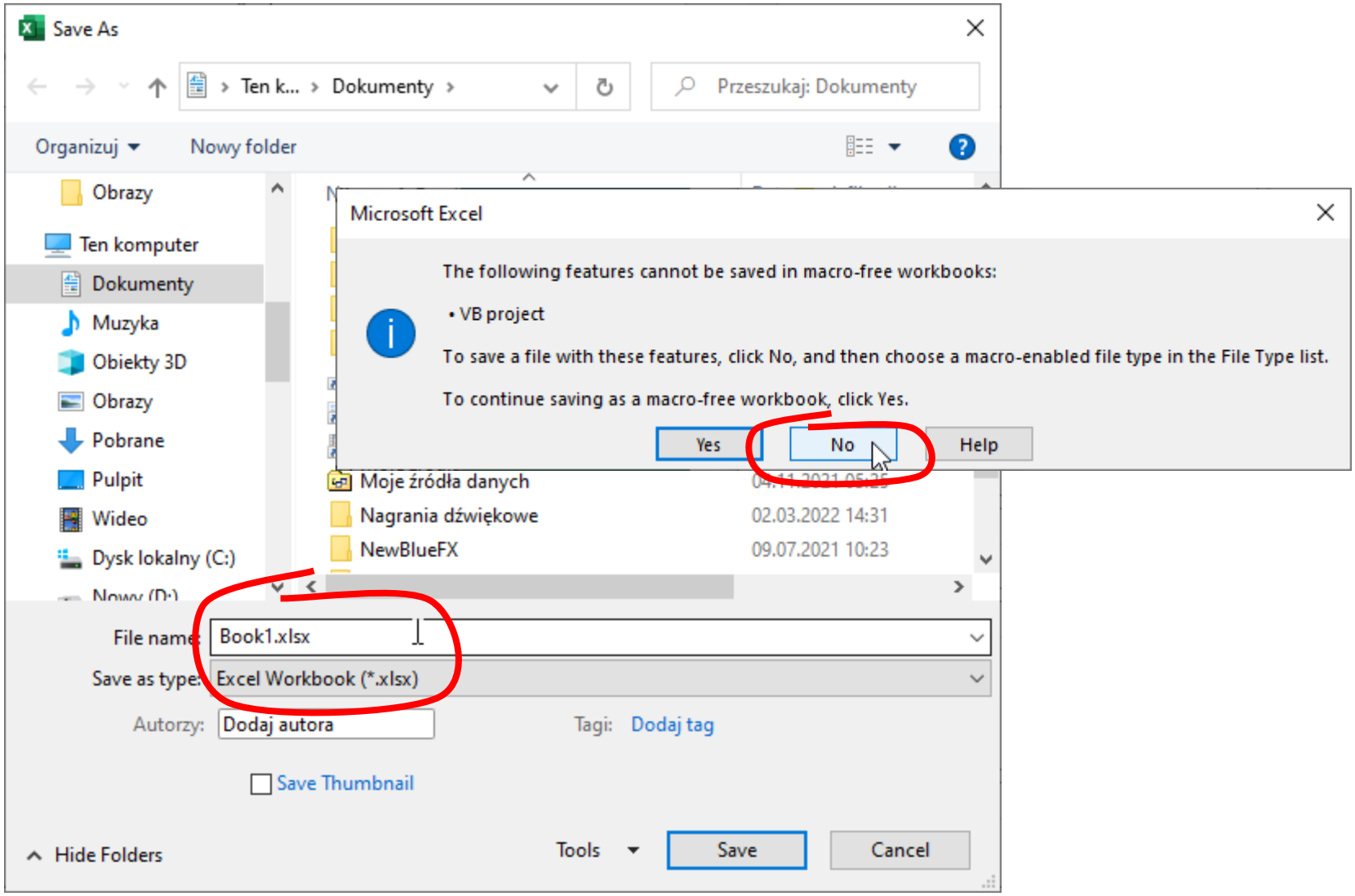
   here: Writes ...

Recording macro – macro List1

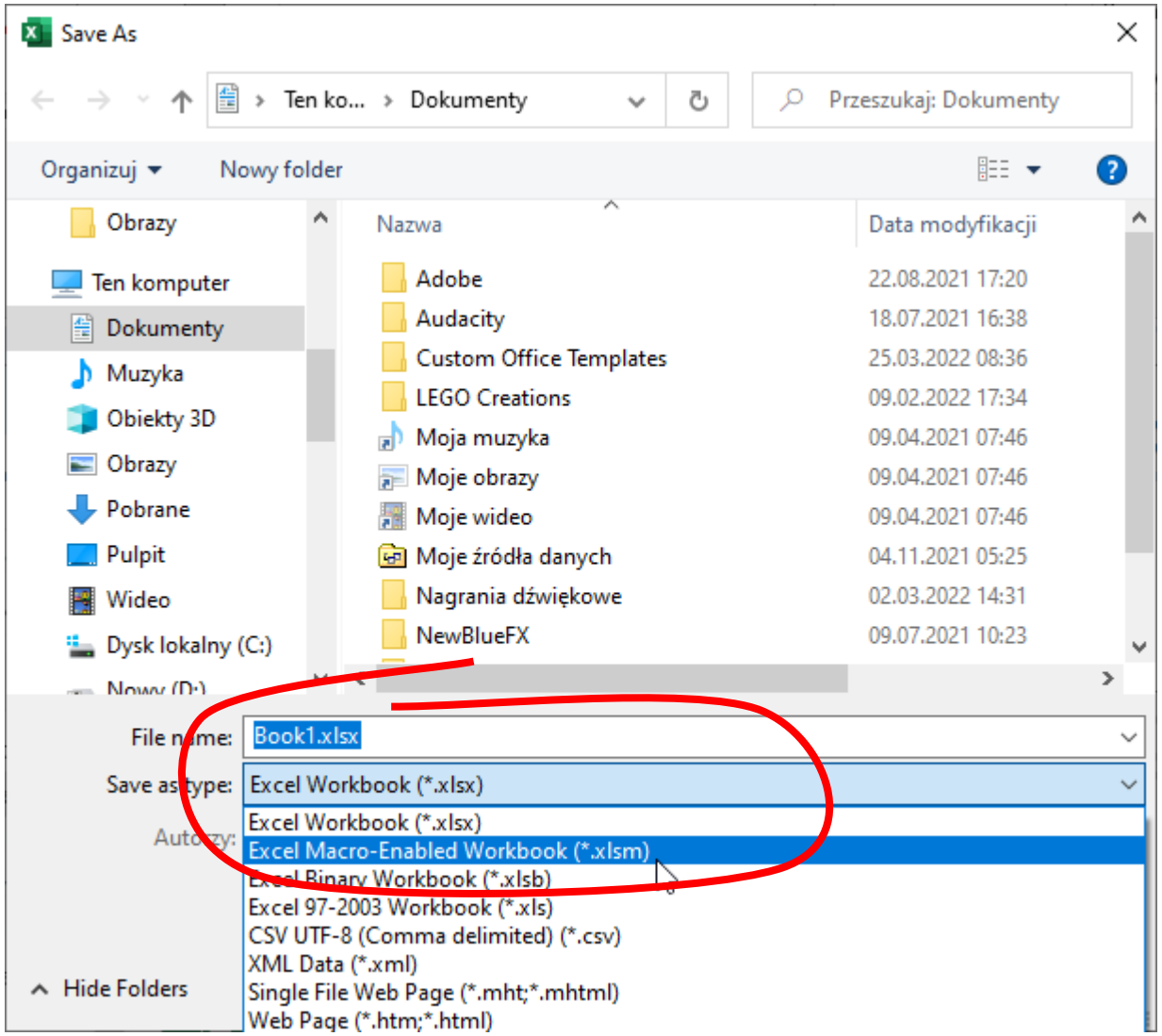


7. write 1
8. set cursor to next cell
9. write 2
10. set cursor to next cell
11. write 3
12. set cursor to next cell
13. write 4
14. set cursor to next cell
15. **stop recording**

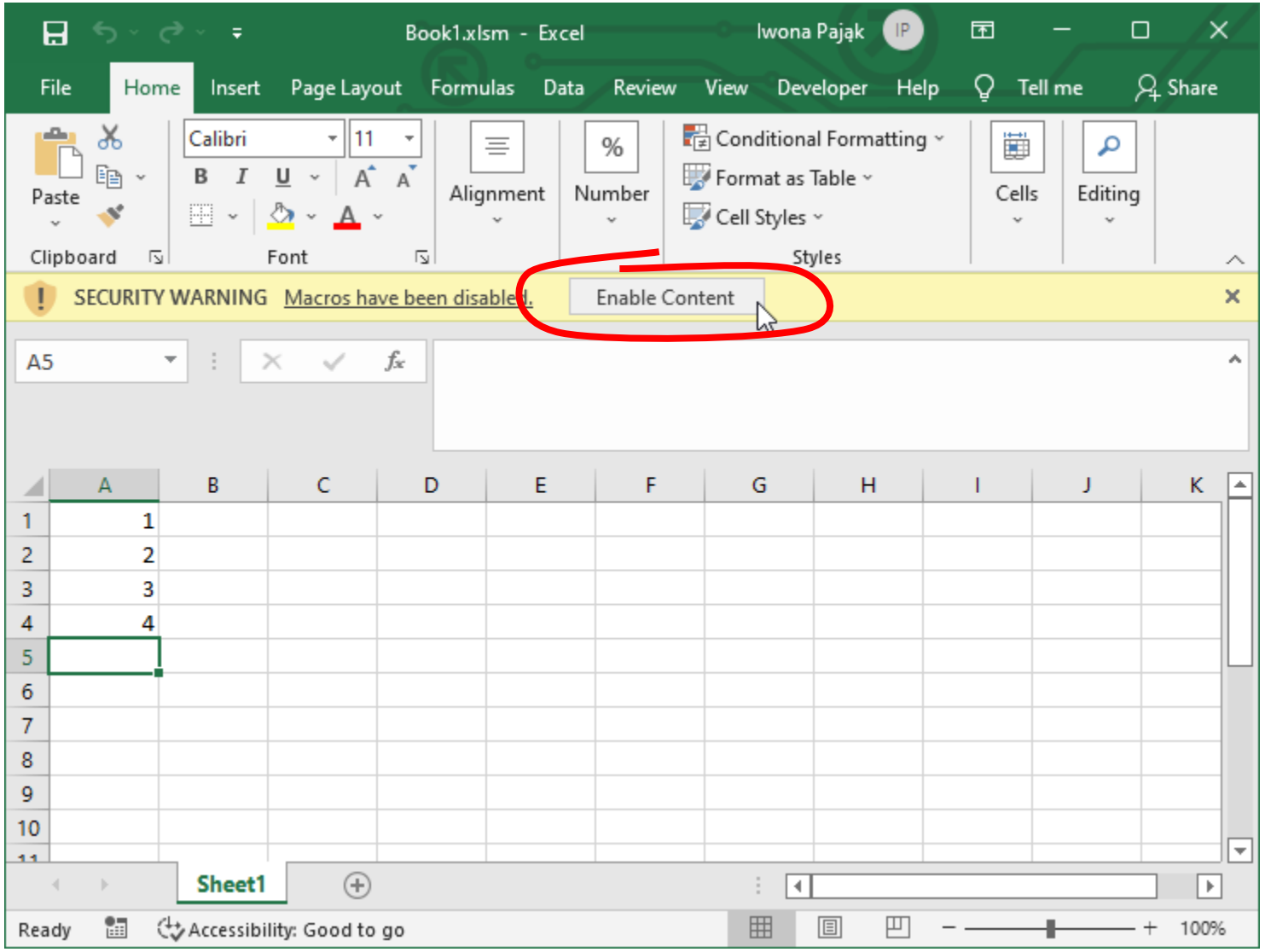
Saving workbook



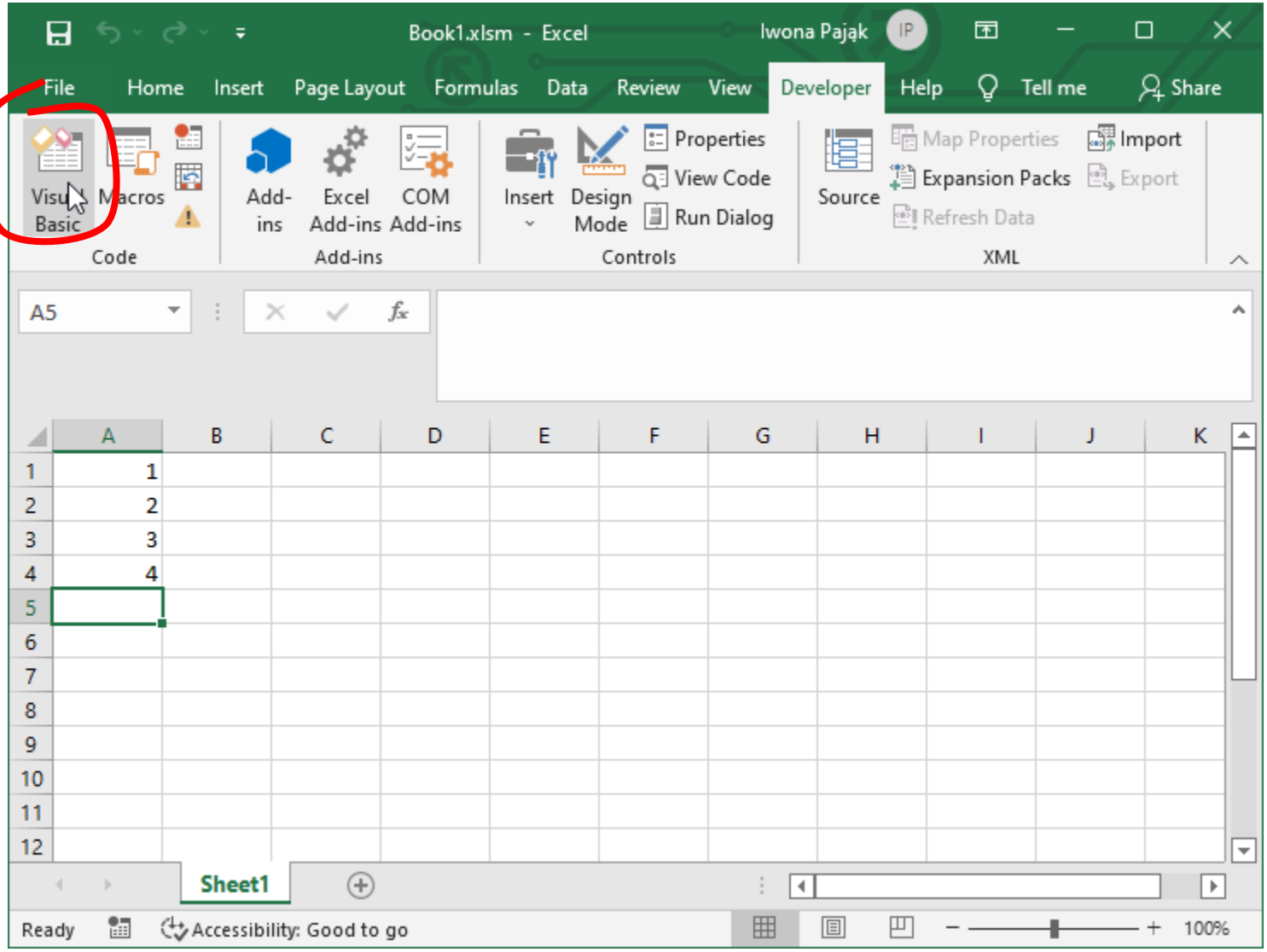
Saving workbook



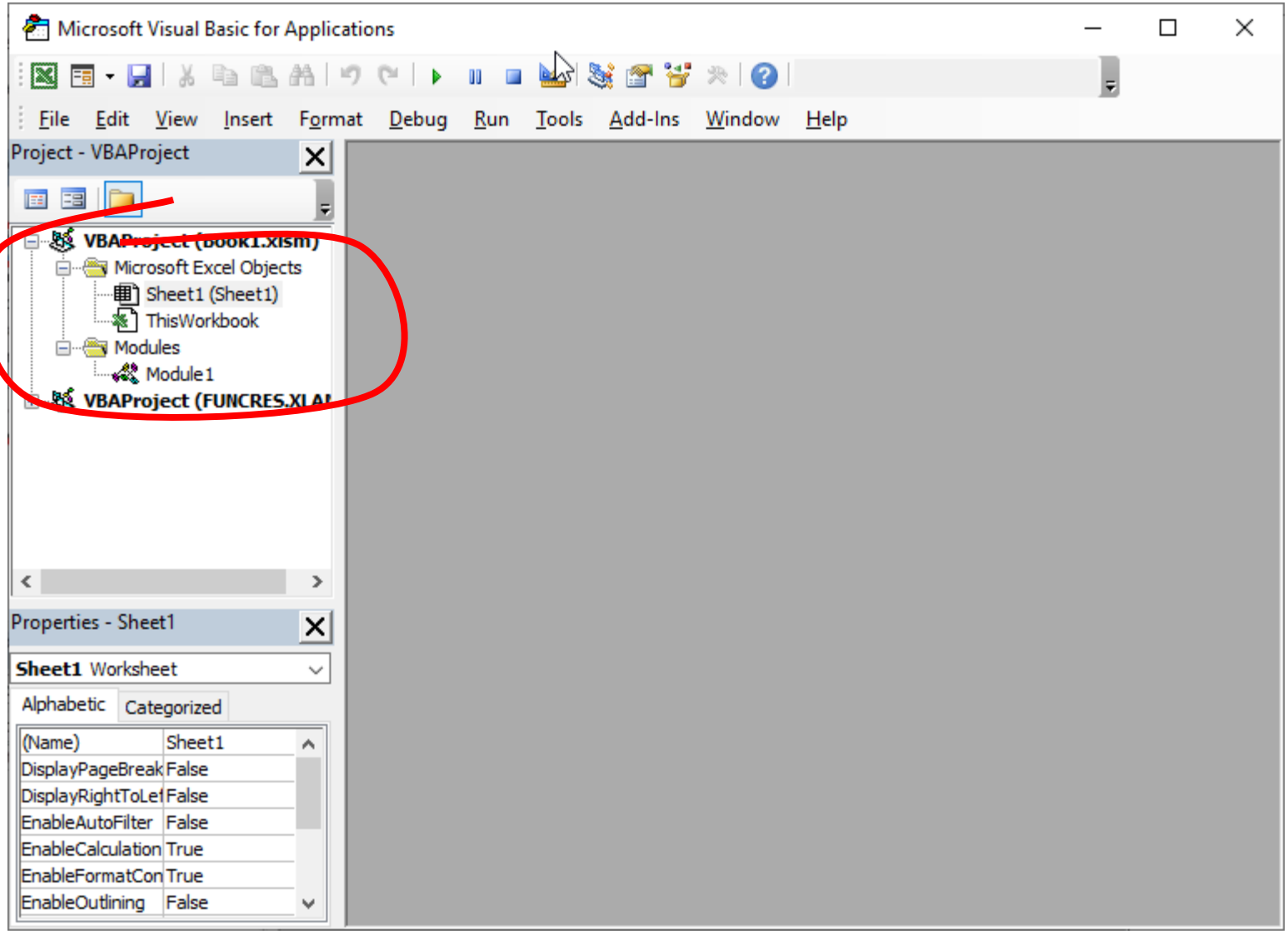
Opening workbook



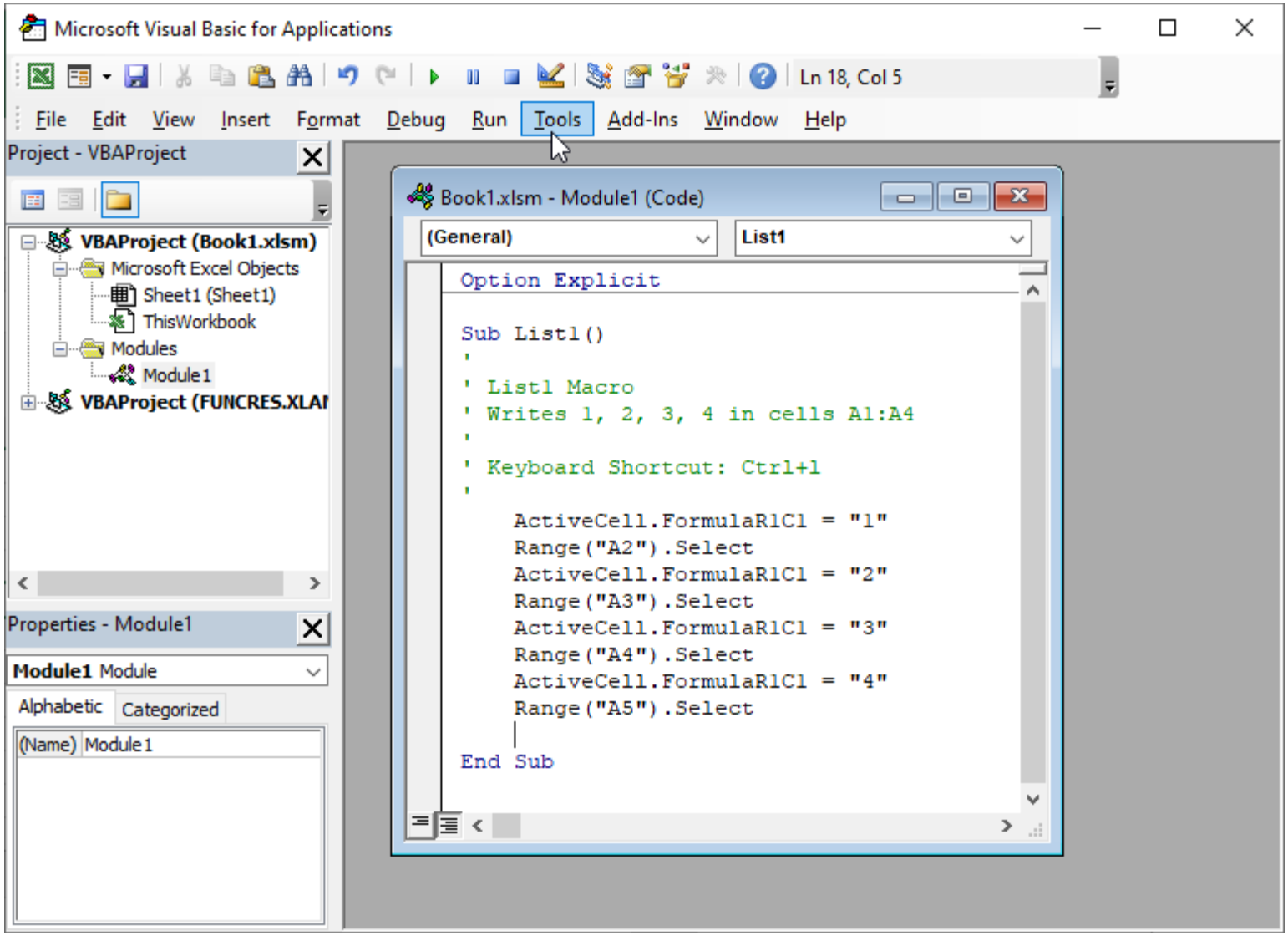
Editing macro – macro List1



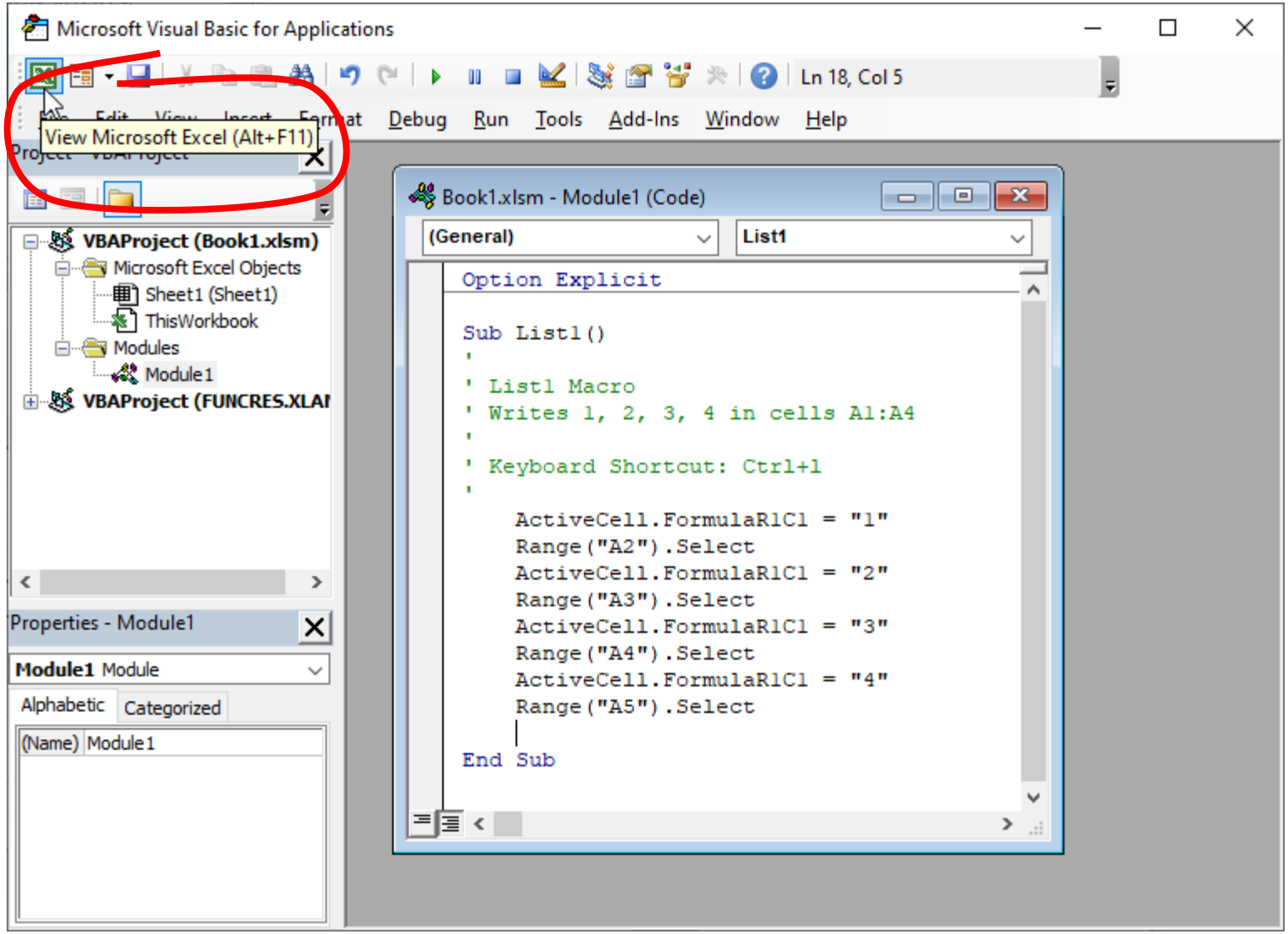
Editing macro – macro List1



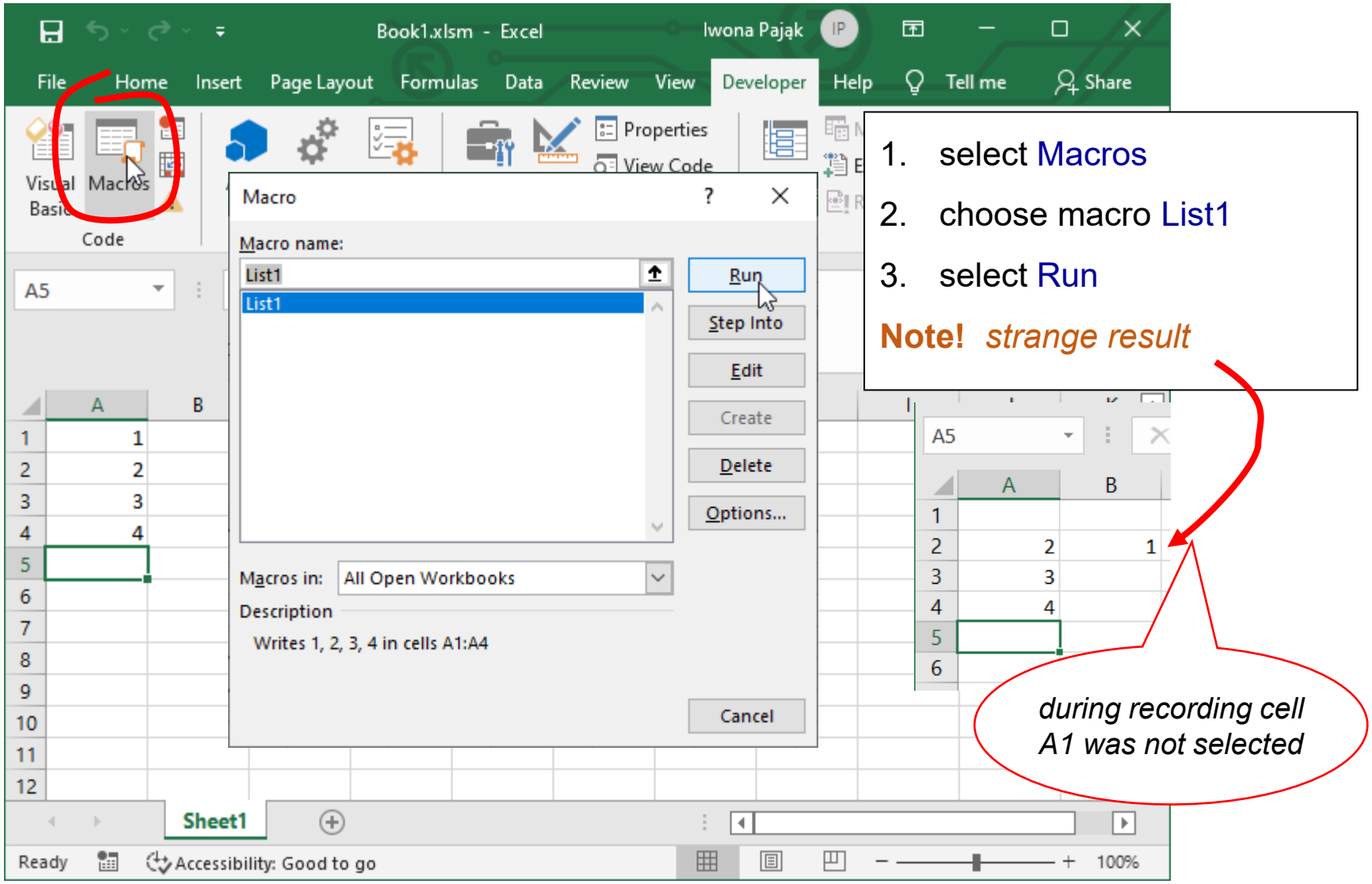
Editing macro – macro List1



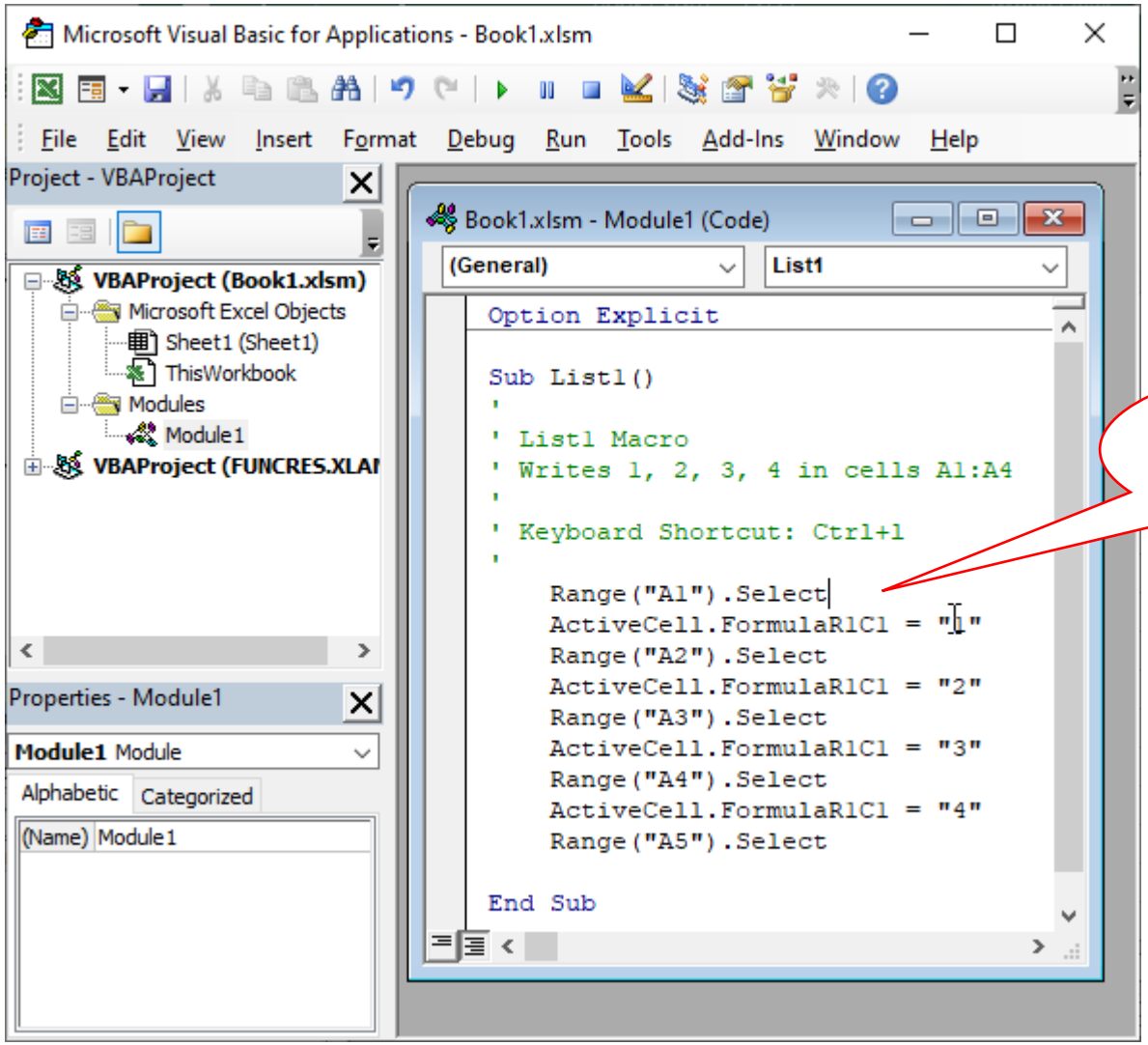
Editing macro – macro List1



Running macro – macro List1 (method 1)

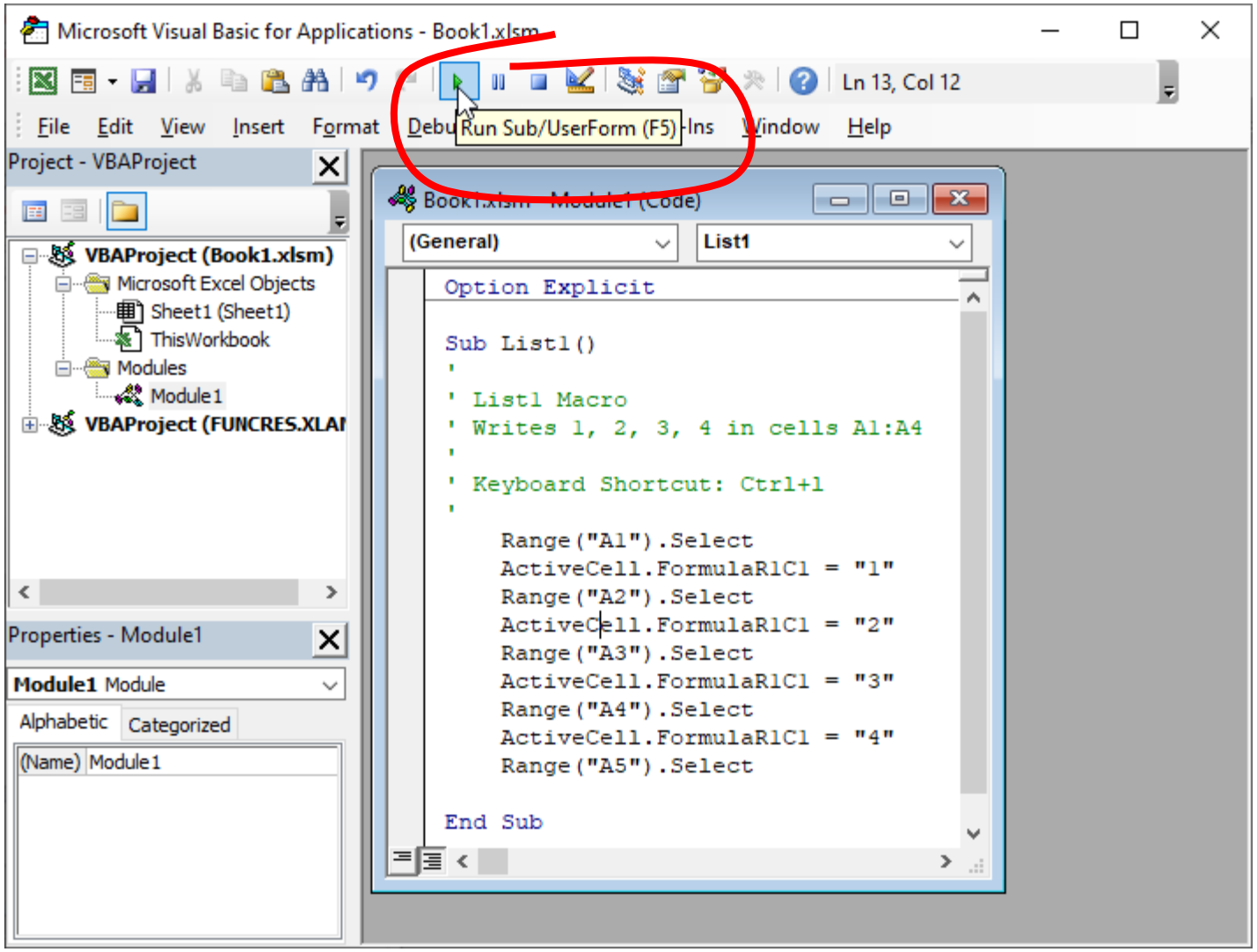


Editing macro – macro List1

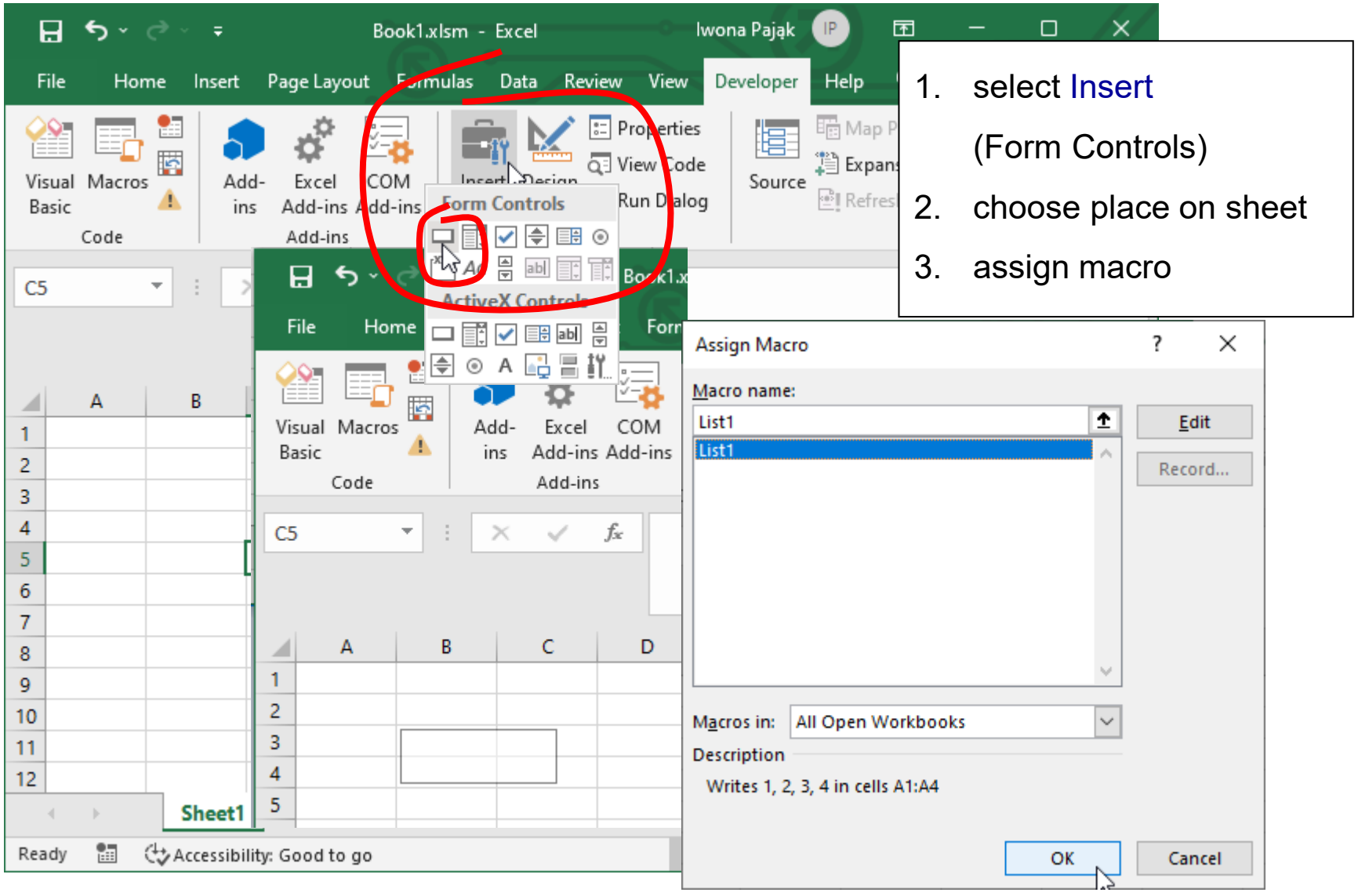


added line with cell A1 selection

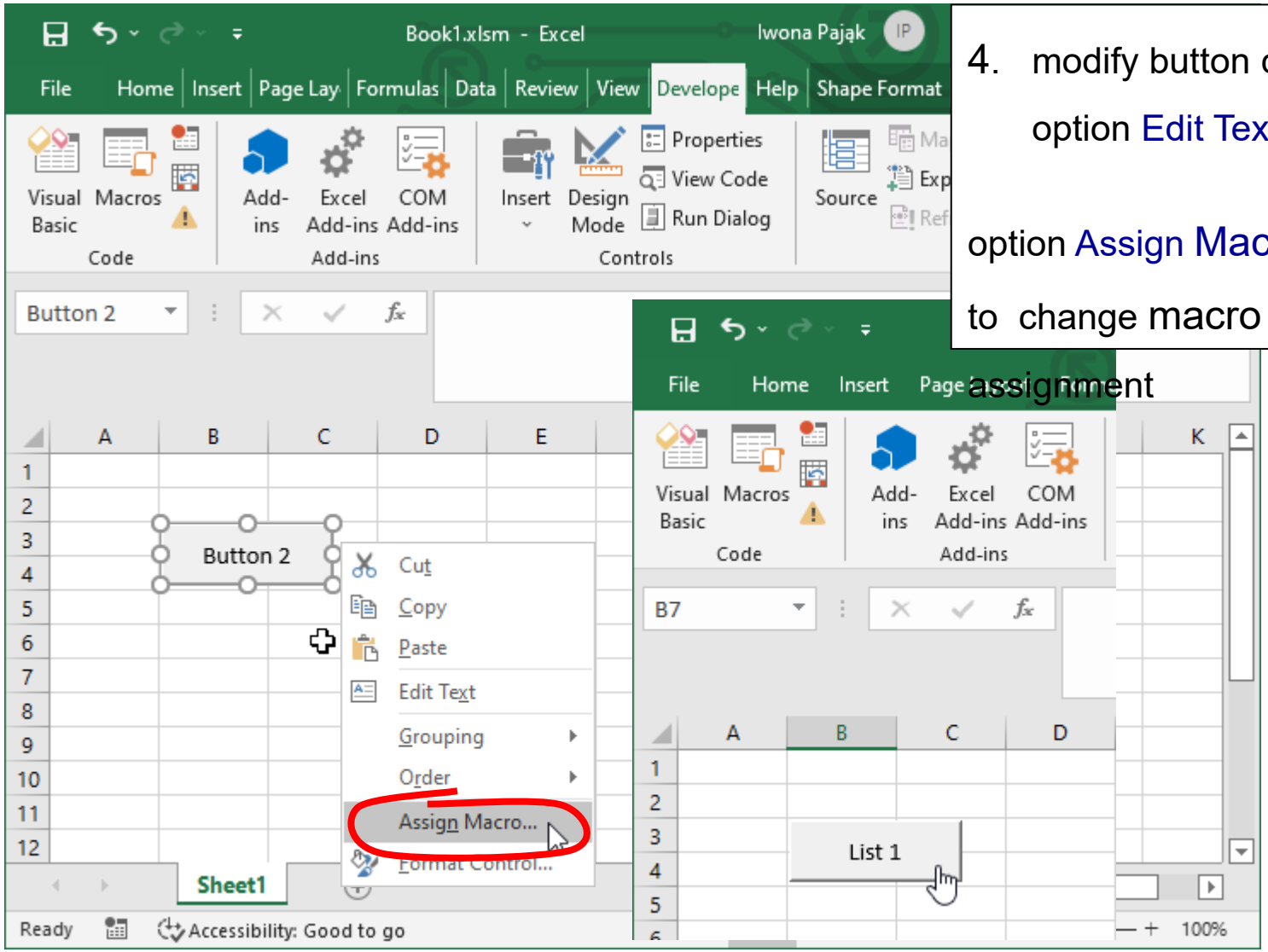
Running macro – macro List1 (method 2)



Running macro – macro List1 (method 3)



Running macro – macro List1 (method 3)

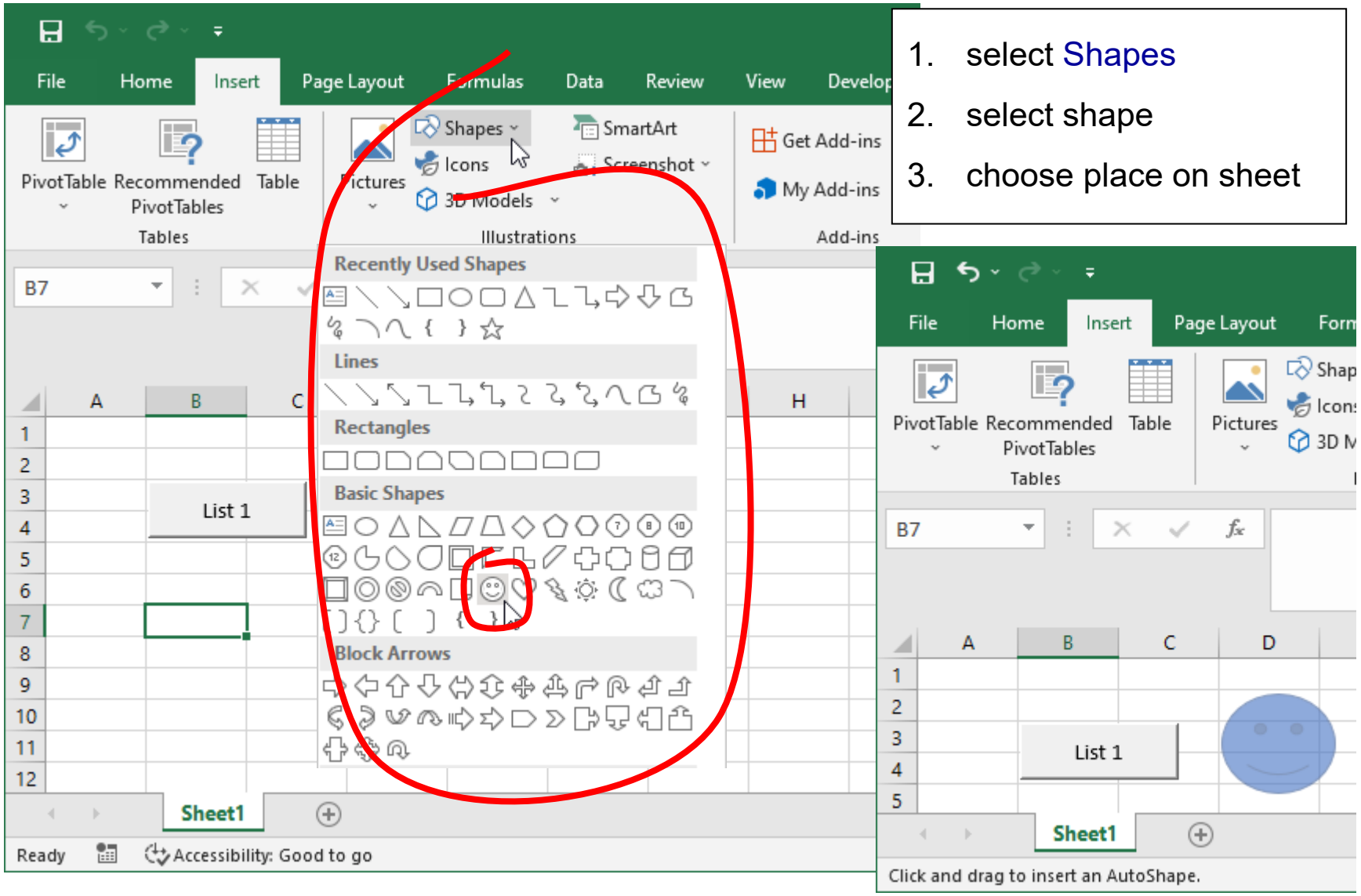


4. modify button caption

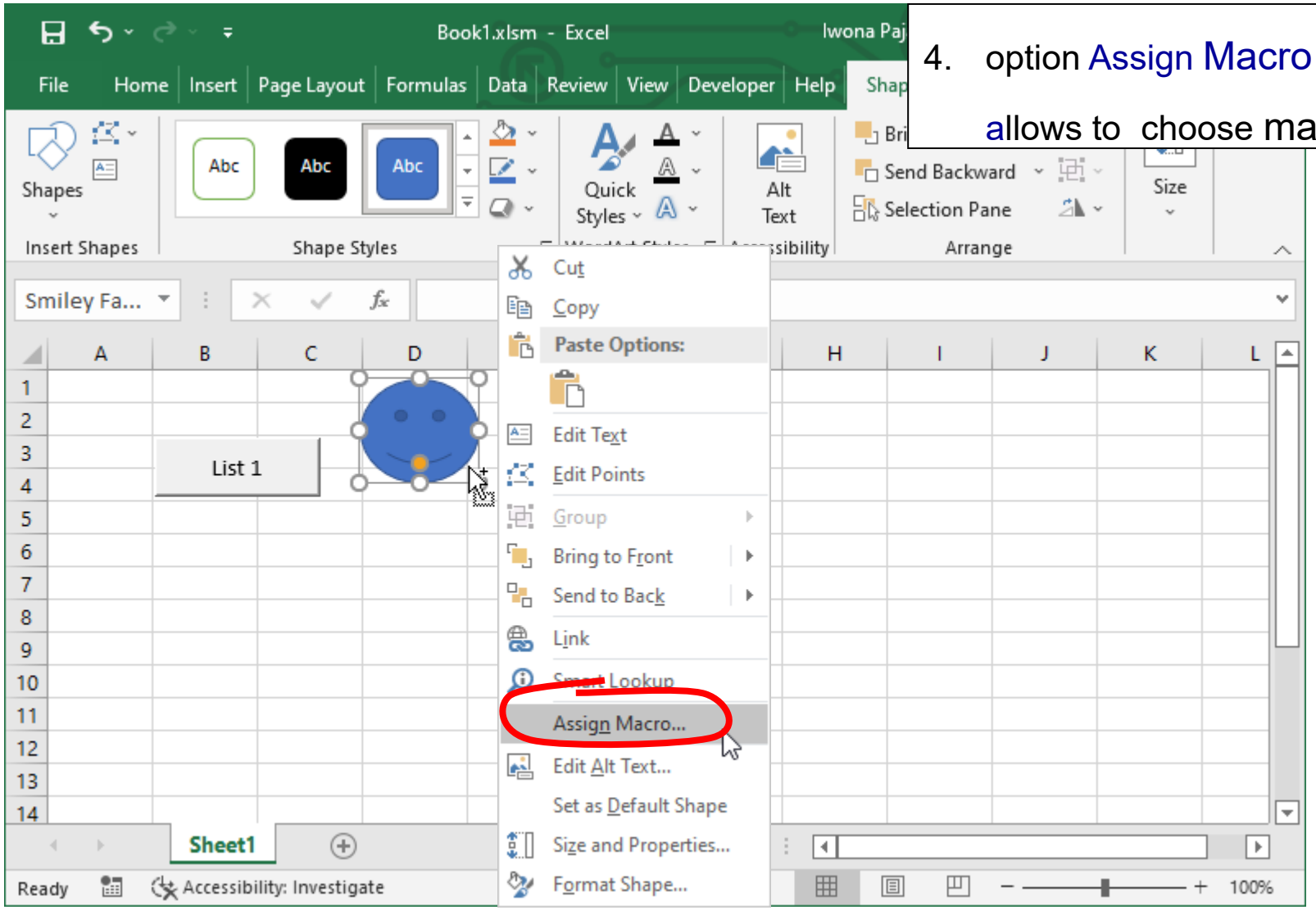
   option Edit Text

option Assign Macro allows to change macro assignment

Running macro – macro List1 (method 4)



Running macro – macro List1 (method 4



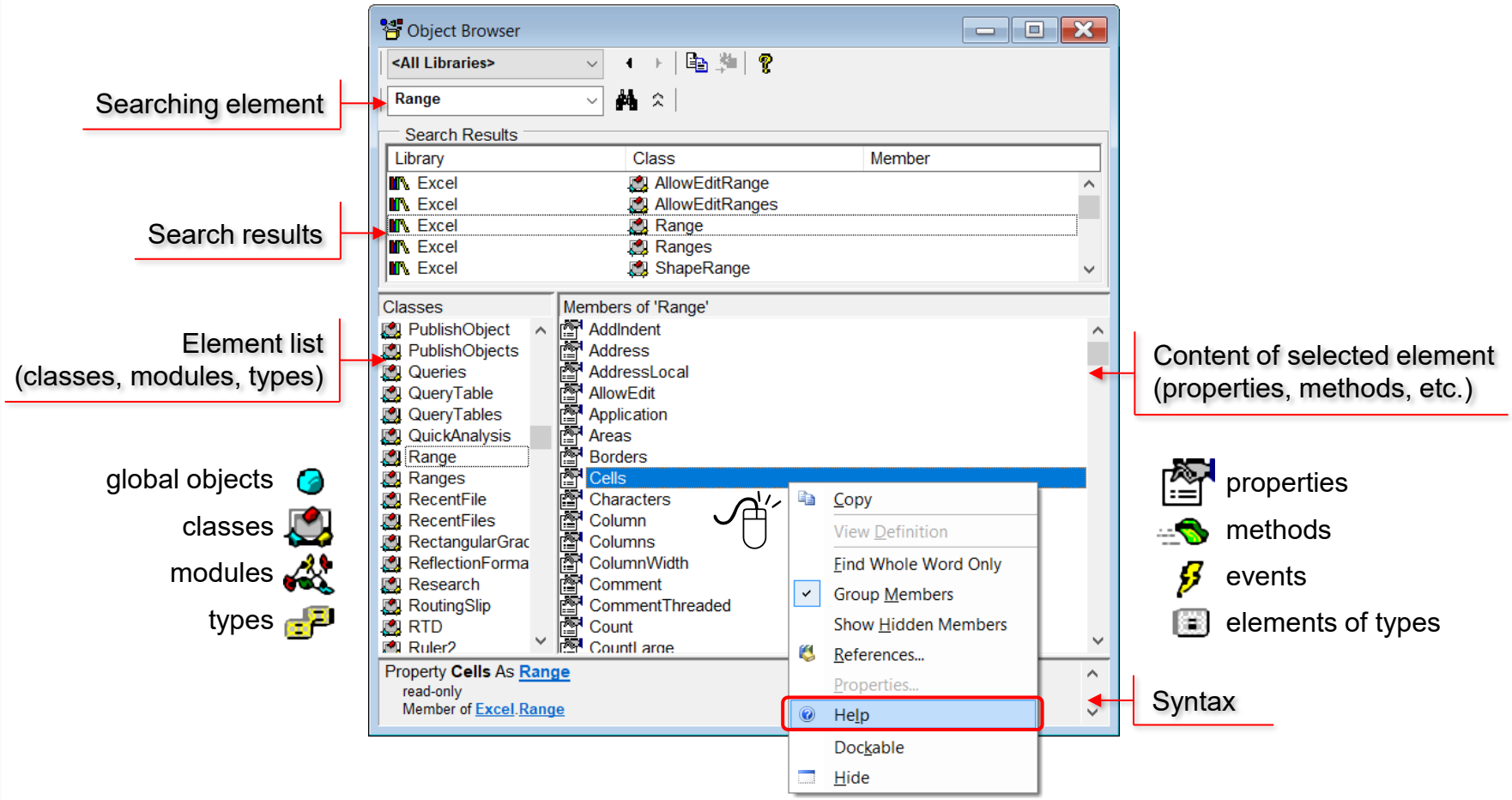
4. option Assign Macro

allows to choose macro

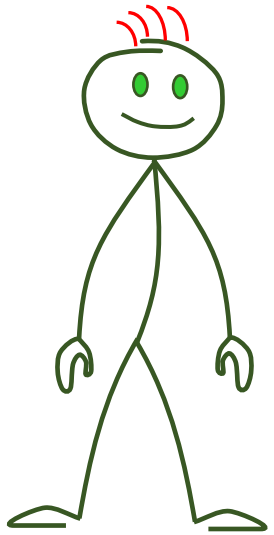
Class Range

Object Browser

Object Browser – the tool accesible in VBA editor, allows to browse classes, their properties and methods.

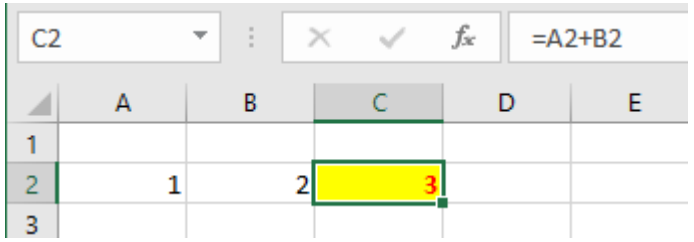


Object model of everything

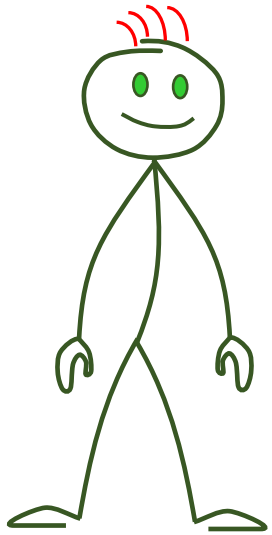


Student	
Property	**Value**
Name	John
Family name	Smith
Height	180
Weight	80
Age	21
Year of study	3
Address	Warsaw
Hair	
Color	red
Length	20
Eyes	
Color	green

Range	
Property	**Value**
Value	3
Formula	=A2+B2
Height	15
Width	48
Left	96
Top	15
Address	C2
Font	
Color	255
Size	11
Interior	
Color	65535

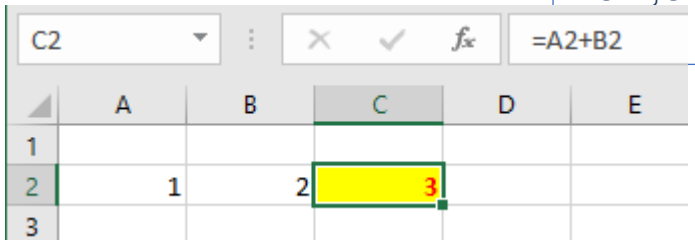


Object model of everything

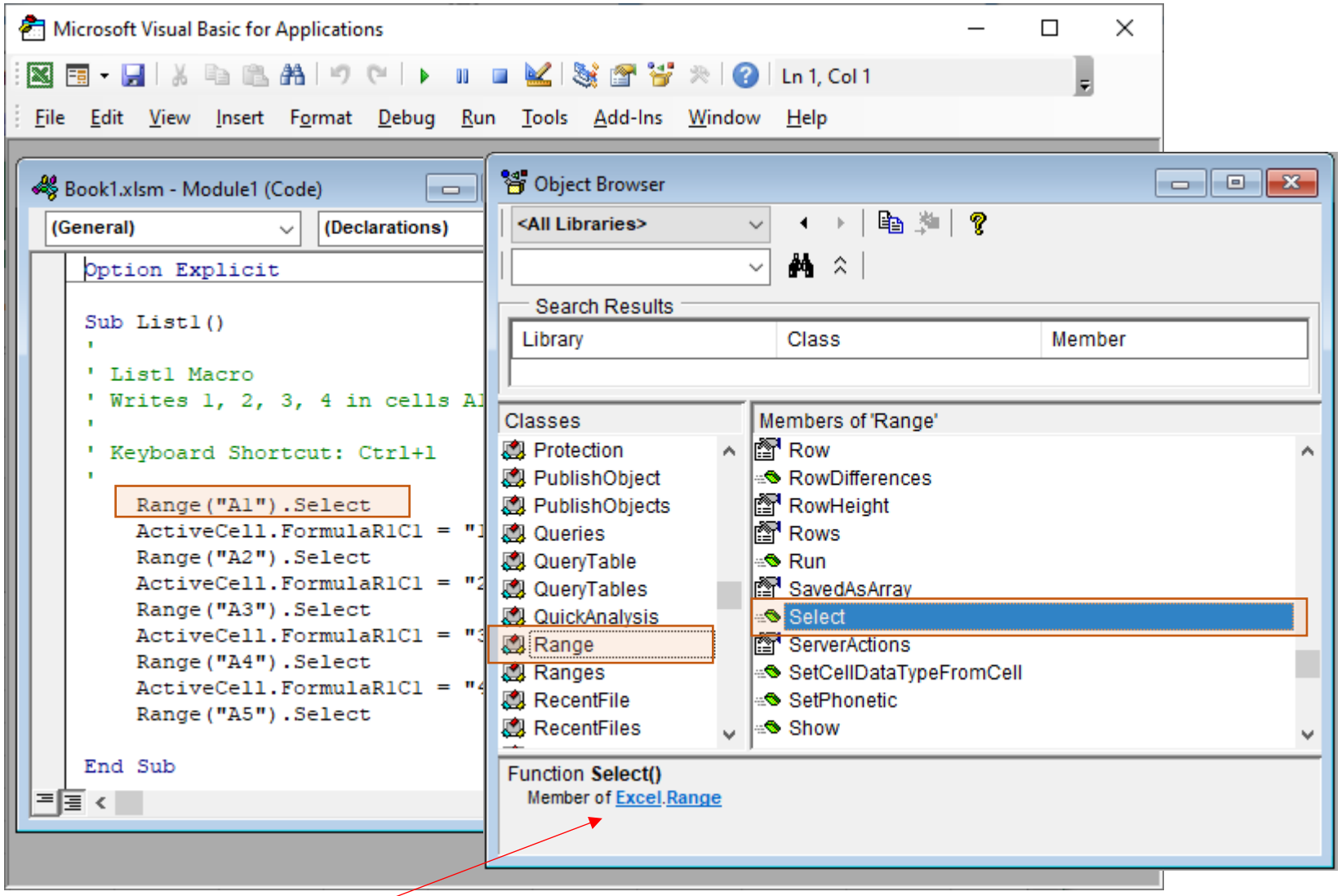


Student	
Method	**Parameters**
Stand up	
Be quiet	
Come to the blackoard	
Sit down	destination, e.g. chair
Answer	question, e.g. 2+2=?

Range	
Method	**Parameters**
Select	
Clear	
Calculate	
Copy	destination, e.g. Range("c3")
Merge	across, e.g. False (merge cells in each row of the range as separate merged cells)

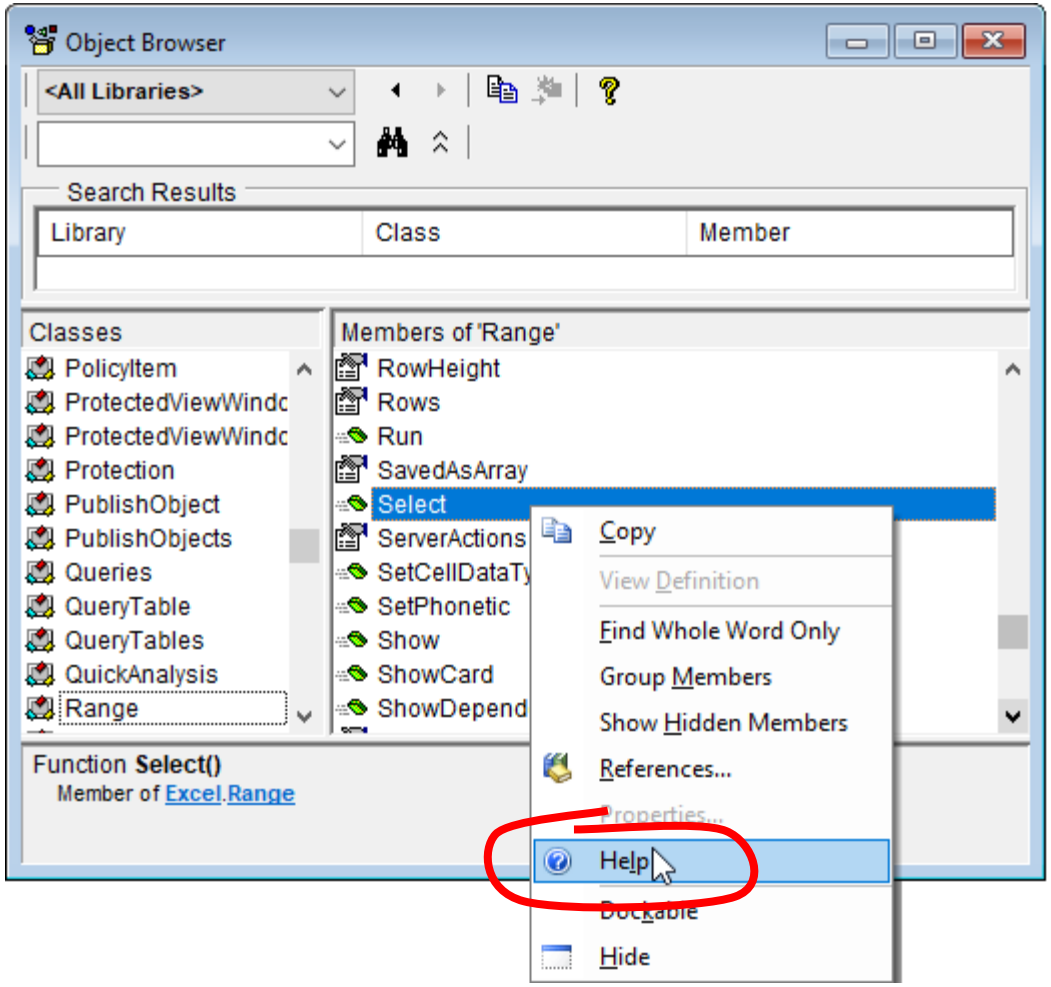


Working with VBA – Object Browser



Select is parameterless method from class **Range**

Working with VBA – Object Browser



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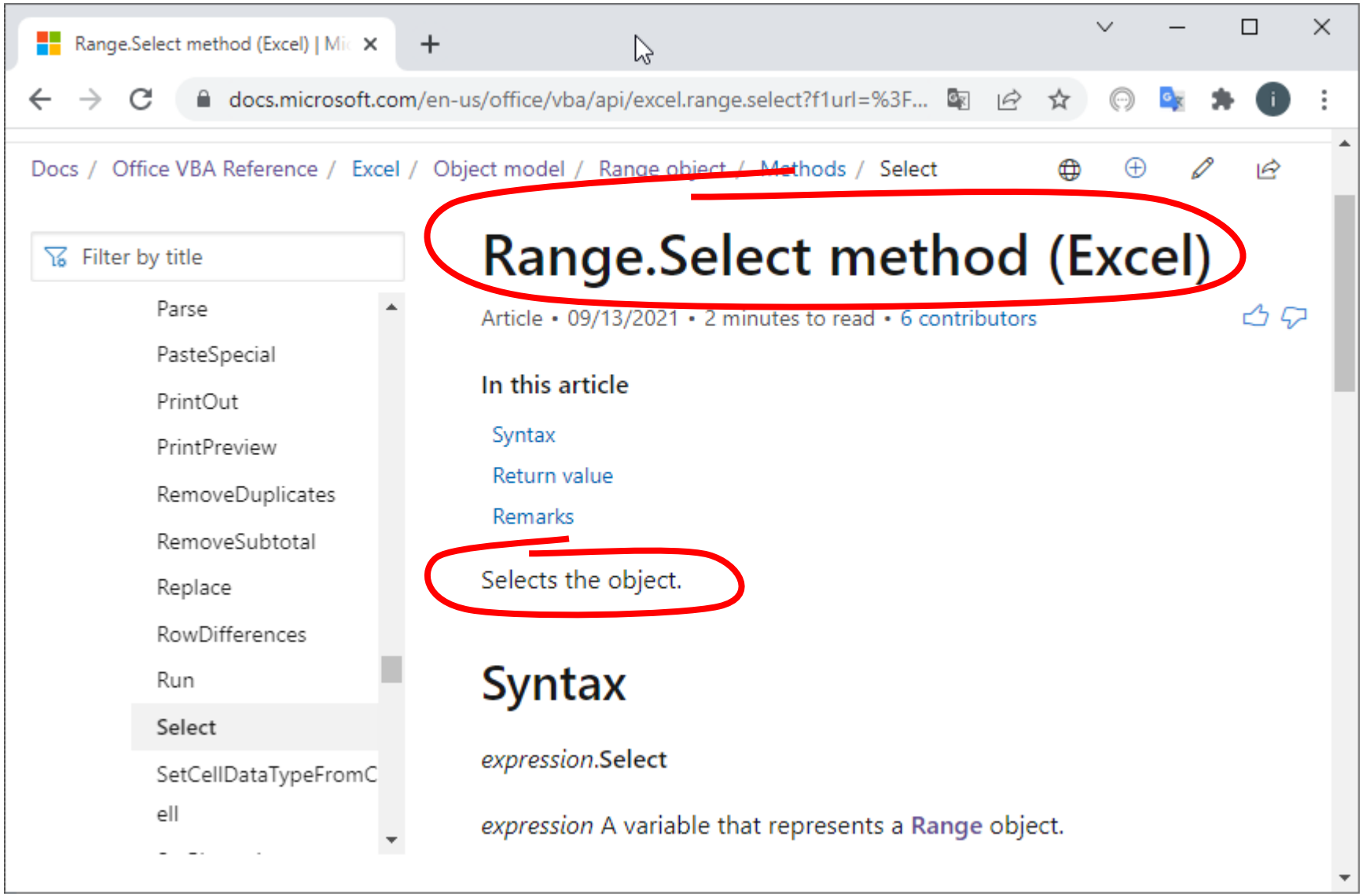
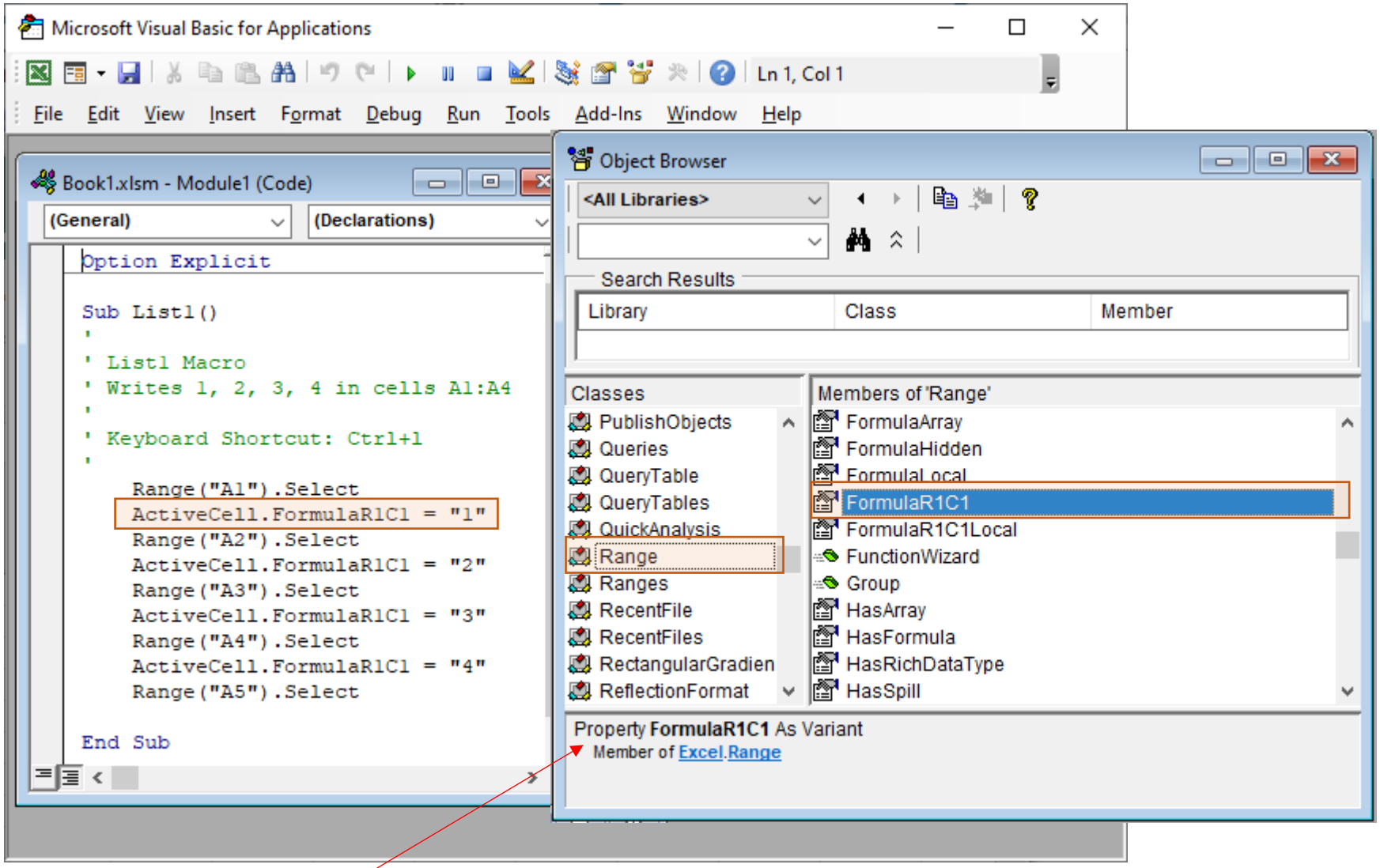


Working with VBA – Object Browser



FormulaR1C1 is property from class **Range**

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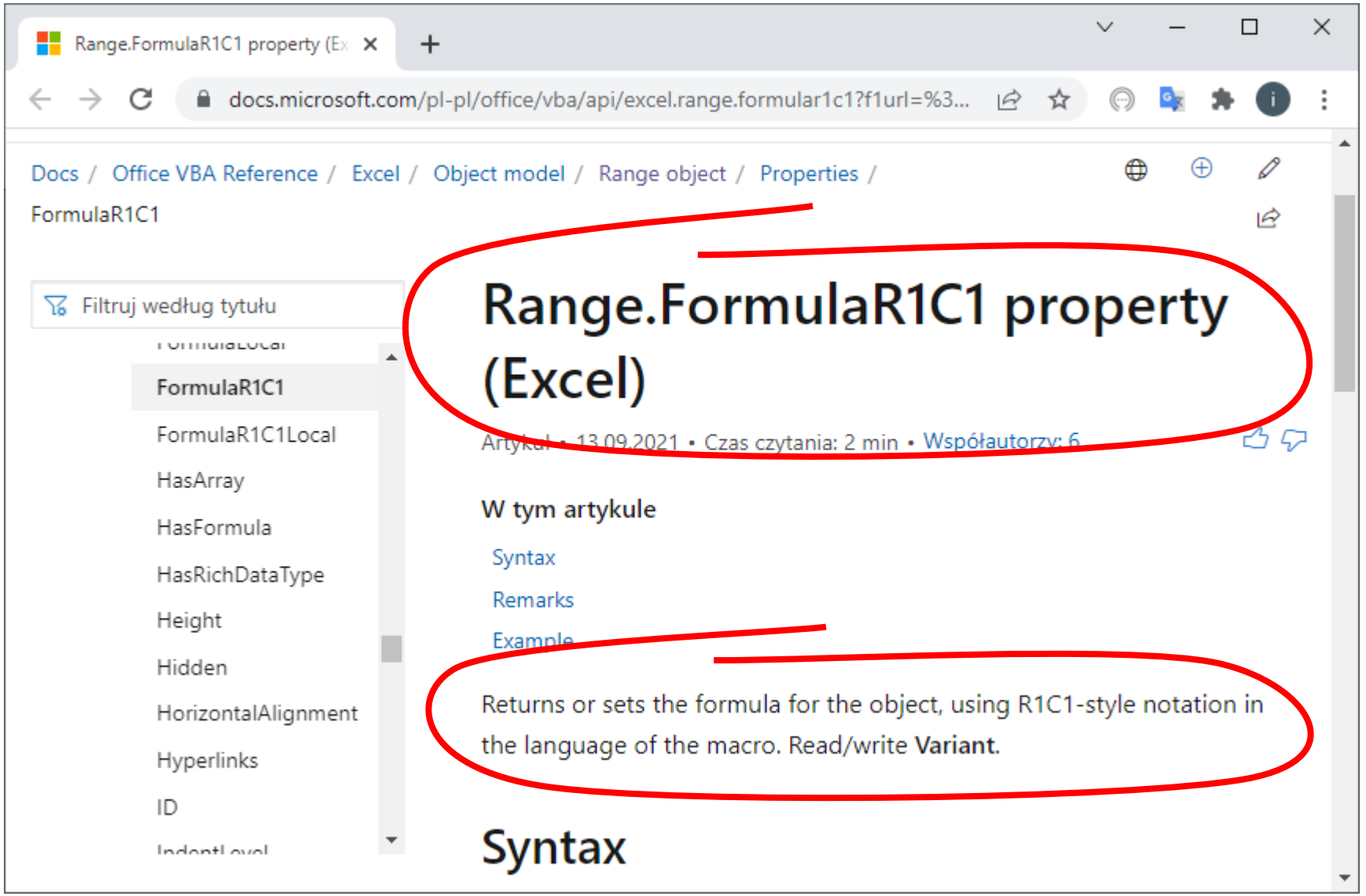
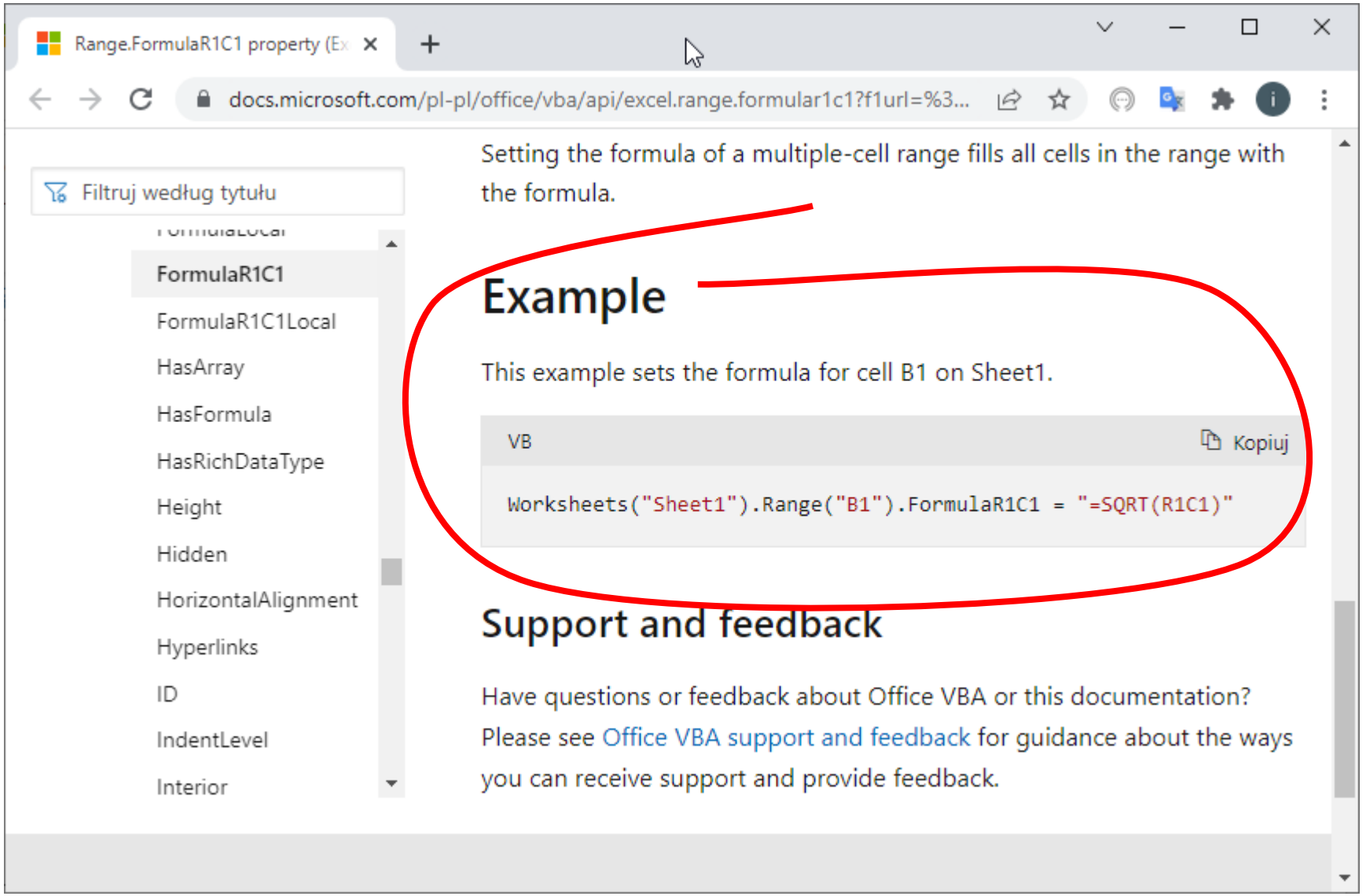


docs.microsoft.com



Range – selected properties

Content

Value – value entered into the cell

Text – content of range as formatted text

Formula, **FormulaR1C1** – formula contained in range in A1 or R1C1 notation

FormulaLocal, **FormulaLocaleR1C1** – localized formula (A1 or R1C1 notation)

Relative ranges

Cells – collection of cells

Columns, Rows – collections of columns or rows

Offset – range shifted by given number rows and columns

Resize – range resized to given number rows and columns

Range – selected properties

Appearance

Font – font used in range (contains name, color, size, etc.)

Interior – style of interior (contains color, pattern, etc.)

Other

Address – address of range (e.g. C3:F5)

Count – number of cells in range

Column, Row – number of first column or row

Macros

Macro

formally: subroutine (sub) or procedure, piece of code performing a specific task, used to

- break down large pieces of code into small parts
- call the same code multiple times

```
Sub name_of_sub()
                          ← body of sub


End Sub
```

Macro List2

Modifying macros – macro List2

```
Sub List1()
'
' List1 Macro
' Writes 1, 2, 3, 4 in cells A1:A4
'
' Keyboard Shortcut: Ctrl+l
'
    Range("A1").Select
    ActiveCell.FormulaR1C1 = "1"
    Range("A2").Select
    ActiveCell.FormulaR1C1 = "2"
    Range("A3").Select
    ActiveCell.FormulaR1C1 = "3"
    Range("A4").Select
    ActiveCell.FormulaR1C1 = "4"
    Range("A5").Select
End Sub
```

String

numbers (Byte, Integer, Long, Single, Double)

```
Sub List2()
'
' List2 Macro
' Writes 1, 2, 3, 4
' in cells A1:A4
'
'
    Range("A1").Value = 1
    Range("A2").Value = 2
    Range("A3").Value = 3
    Range("A4").Value = 4
End Sub
```

Macro List3

Macro List3

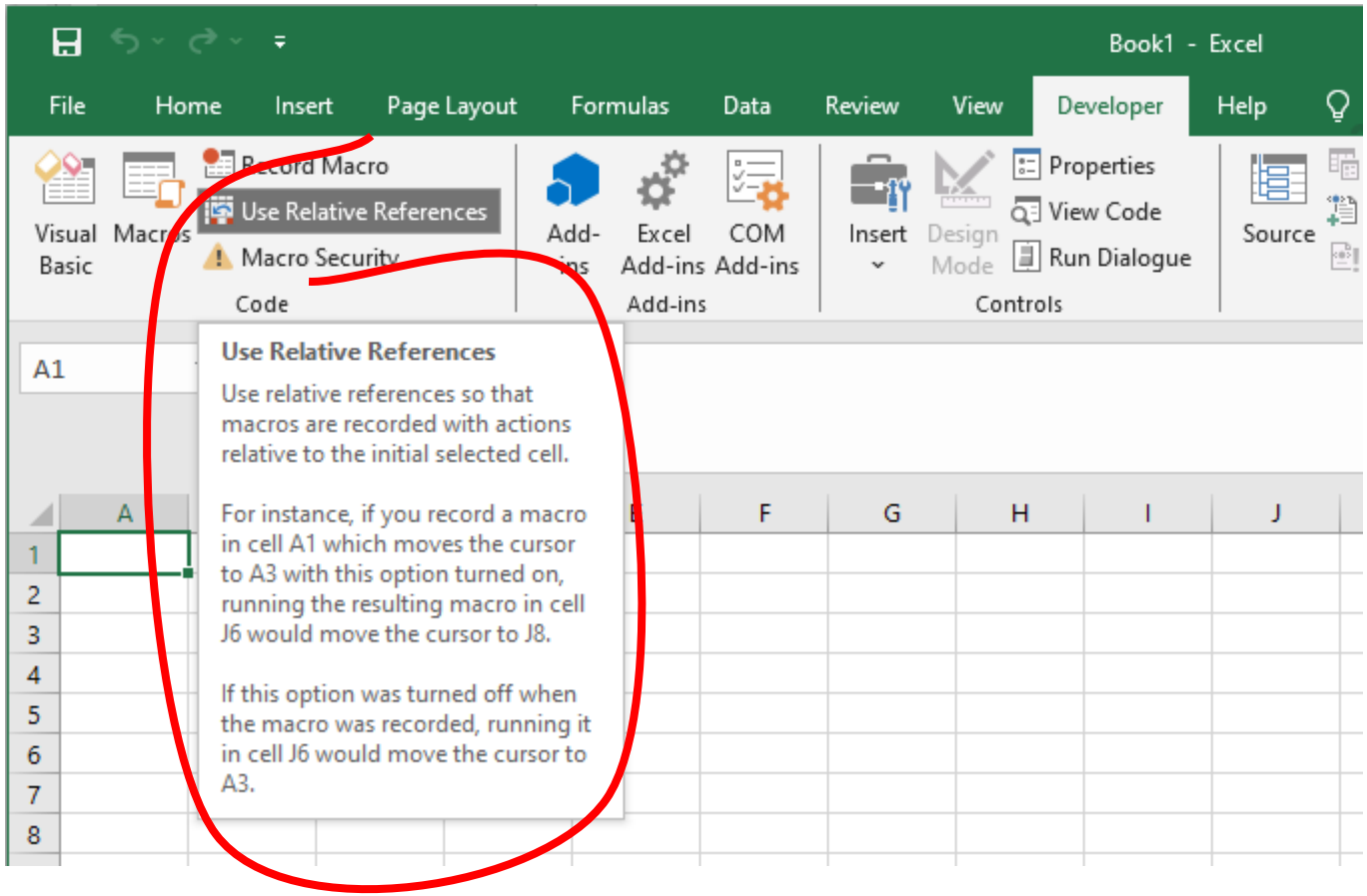
Assumptions

macro writes down:

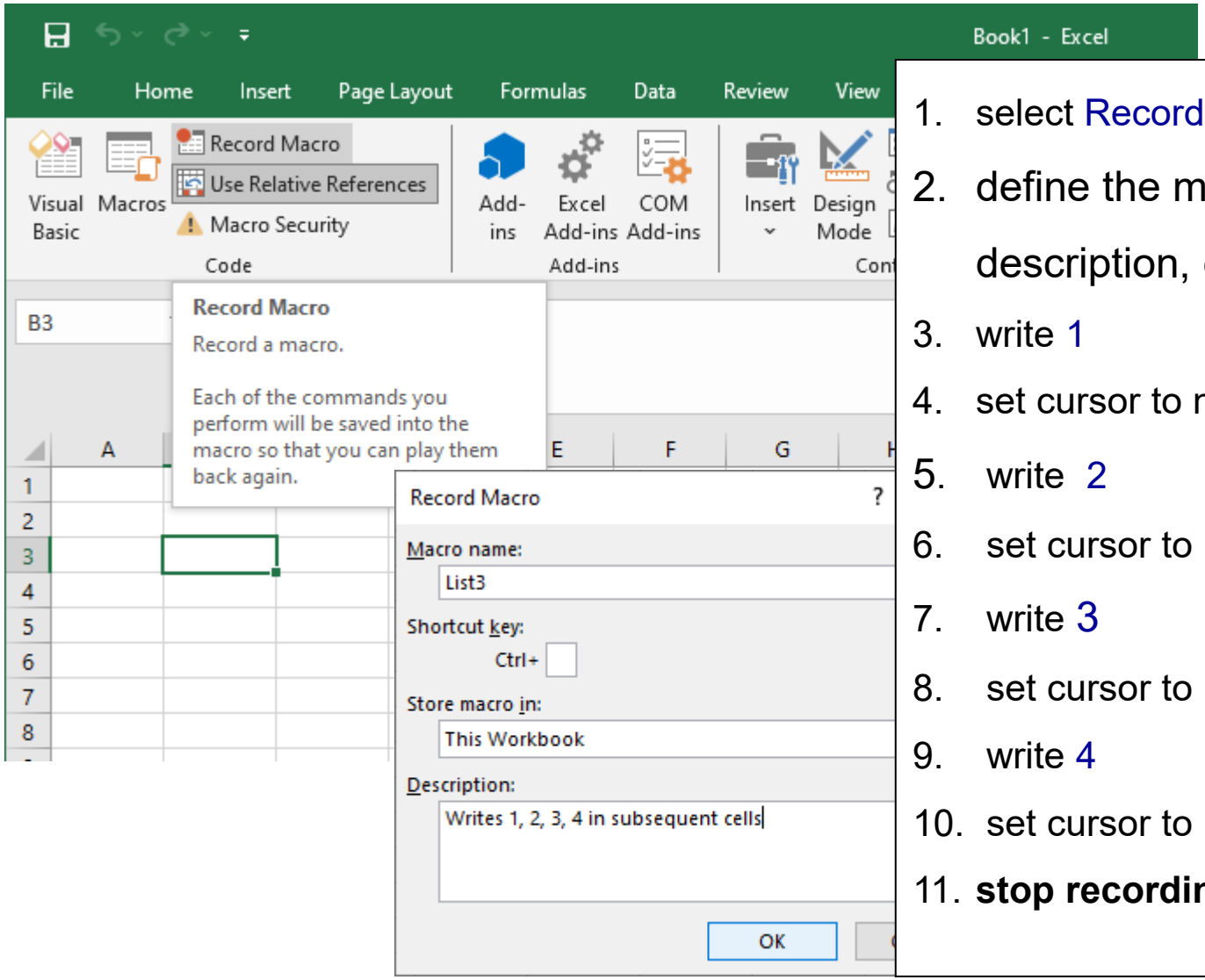
- digit 1 in the active cell
- digit 2 in the cell below
- digit 3 in the cell below
- digit 4 in the cell below

	A	B	C
1			
2		1	
3		2	
4		3	
5		4	
6			
7			

Recording macro – macro List3

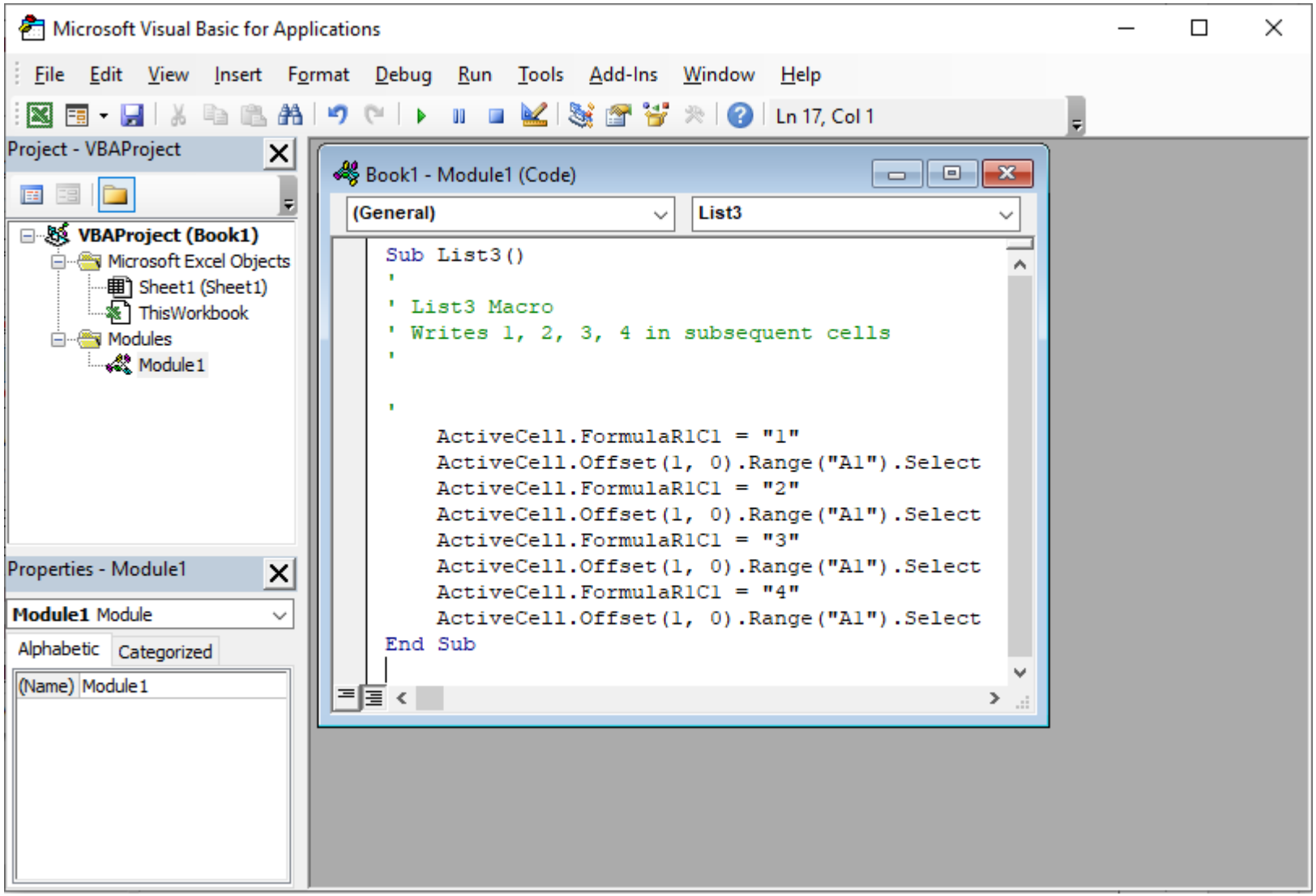


Recording macro – macro List3



1. select Record Macro
2. define the macro name, description, etc.
3. write 1
4. set cursor to next cell
5. write 2
6. set cursor to next cell
7. write 3
8. set cursor to next cell
9. write 4
10. set cursor to next cell
11. **stop recording**

Editing macro – macro List3



Macro List4

Modifying macros – macro List4

```
Sub List3()
'
' List1 Macro
' Writes 1, 2, 3, 4 in subsequent cells
'
    ActiveCell.FormulaR1C1 = "1"
    ActiveCell.Offset(1, 0).Range("A1").Select
    ActiveCell.FormulaR1C1 = "2"
    ActiveCell.Offset(1, 0).Range("A1").Select
    ActiveCell.FormulaR1C1 = "3"
    ActiveCell.Offset(1, 0).Range("A1").Select
    ActiveCell.FormulaR1C1 = "4"
    ActiveCell.Offset(1, 0).Range("A1").Select
End Sub
```

```
Sub List4()
'
' List4 Macro
' Writes 1, 2, 3, 4 in subsequent cells
'
    ActiveCell.Value = 1
    ActiveCell.Offset(1, 0).Value = 2
    ActiveCell.Offset(2, 0).Value = 3
    ActiveCell.Offset(3, 0).Value = 4
End Sub
```

Displaying messages

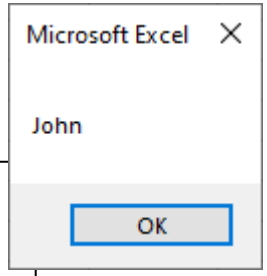
Displaying messages

```
Sub Message1()
'
' Displaying message: Hello
'
    MsgBox "Hello"
End Sub
```

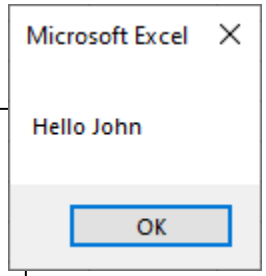

```
Sub List4()
'
' List4 Macro
' Writes 1, 2, 3, 4 in subsequent cells
'
    MsgBox "Subsequent cells filled in 1..4"
    ActiveCell.Value = 1
    ActiveCell.Offset(1, 0).Value = 2
    ActiveCell.Offset(2, 0).Value = 3
    ActiveCell.Offset(3, 0).Value = 4
End Sub
```

Displaying messages

	A	B	C
1			
2		John	
3			




```
Sub Message2()
'
' Displays the contents of cell B2
'
    MsgBox Range("B2").Value
End Sub
```




```
Sub Message3()
'
' Displays message:
' text Hello and the contents of cell B2
'
    MsgBox "Hello " & Range("B2").Value
End Sub
```

VBA

Variables, assignment

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Variable

A named storage location that can contain data that can be modified during program execution. Each variable has a name that **uniquely** identifies it within its scope. A data type can be specified or not.

Variable names must begin with an alphabetic character, must be unique within the same scope, can't be longer than 255 characters, and can't contain an embedded period or type-declaration character.

Dim statement

Declares variables and allocates storage space.

```
Dim a As Integer
Dim b As Single, c As Single
Dim d
Dim length As Integer
Dim surname As String
Dim r As Range
```

Writing assignment statements

Assignment statements assign a value or expression to a variable or constant. Assignment statements always include an equal sign (=).

```
a = 2
b = 2.5
c = 5/3
d = 3.2
length = 5
surname = "Doe"
```

```
Dim a As Integer
Dim b As Single, c As Single
Dim d
Dim length As Integer
Dim surname As String
```

Set statement

The **Set** statement is used to assign an object to a variable that has been declared as an object. The Set keyword is required.

```
Set r = Range("a1")
```

```
Dim r As Range
```

Macros modifications

Modifying macros – using variables

```
Sub List4()
    ActiveCell.Value = 1
    ActiveCell.Offset(1, 0).Value = 2
    ActiveCell.Offset(2, 0).Value = 3
    ActiveCell.Offset(3, 0).Value = 4
End Sub
```

```
Sub List5a()
Dim n1 As Integer, n2 As Integer
Dim n3 As Integer, n4 As Integer

  n1 = 1
  n2 = n1 + 1
  n3 = n1 + 2
  n4 = n1 + 3
  ActiveCell.Value = n1
  ActiveCell.Offset(1, 0).Value = n2
  ActiveCell.Offset(2, 0).Value = n3
  ActiveCell.Offset(3, 0).Value = n4
End Sub
```

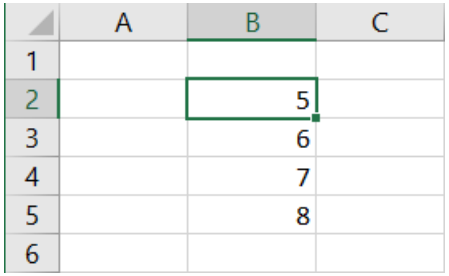
```
Sub List5b()
Dim n As Integer

  n = 1
  ActiveCell.Value = n
  ActiveCell.Offset(1, 0).Value = n+1
  ActiveCell.Offset(2, 0).Value = n+2
  ActiveCell.Offset(3, 0).Value = n+3
End Sub
```

New macro – macro List6

Assumptions

macro

- gets value from the current cell
- puts value increased by 1 in the cell 1 row below
- puts value increased by 2 in the cell 2 rows below
- puts value increased by 3 in the cell 3 rows below



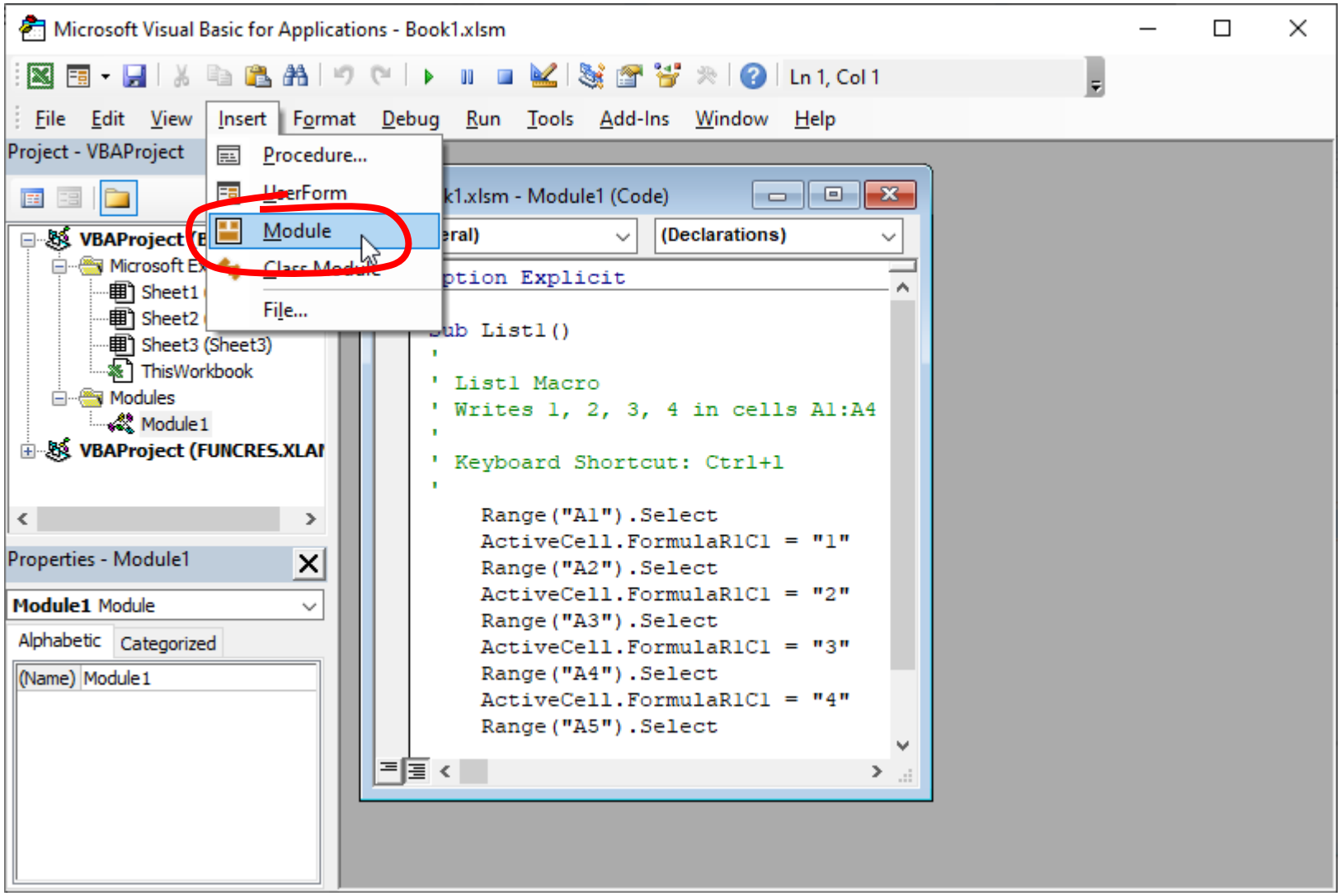
	A	B	C
1			
2		5	
3		6	
4		7	
5		8	
6			

```
Sub List5b()
Dim n As Integer
  n = 1
  ActiveCell.Value = n
  ActiveCell.Offset(1, 0).Value = n+1
  ActiveCell.Offset(2, 0).Value = n+2
  ActiveCell.Offset(3, 0).Value = n+3
End Sub
```

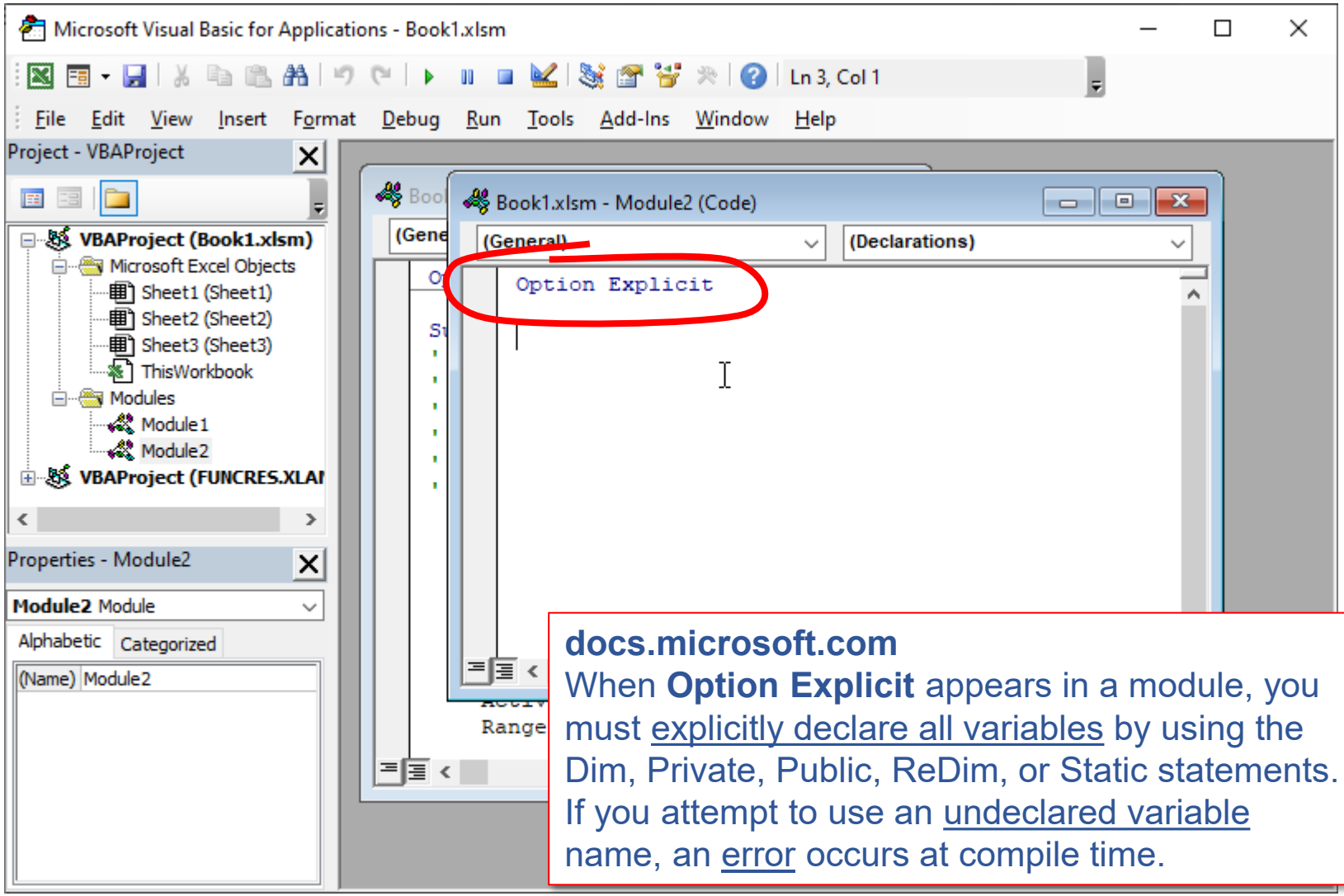
```
Sub List6()
Dim n As Integer
  n = ActiveCell.Value
  ActiveCell.Offset(1, 0).Value = n+1
  ActiveCell.Offset(2, 0).Value = n+2
  ActiveCell.Offset(3, 0).Value = n+3
End Sub
```

VBA environment

Creating new module

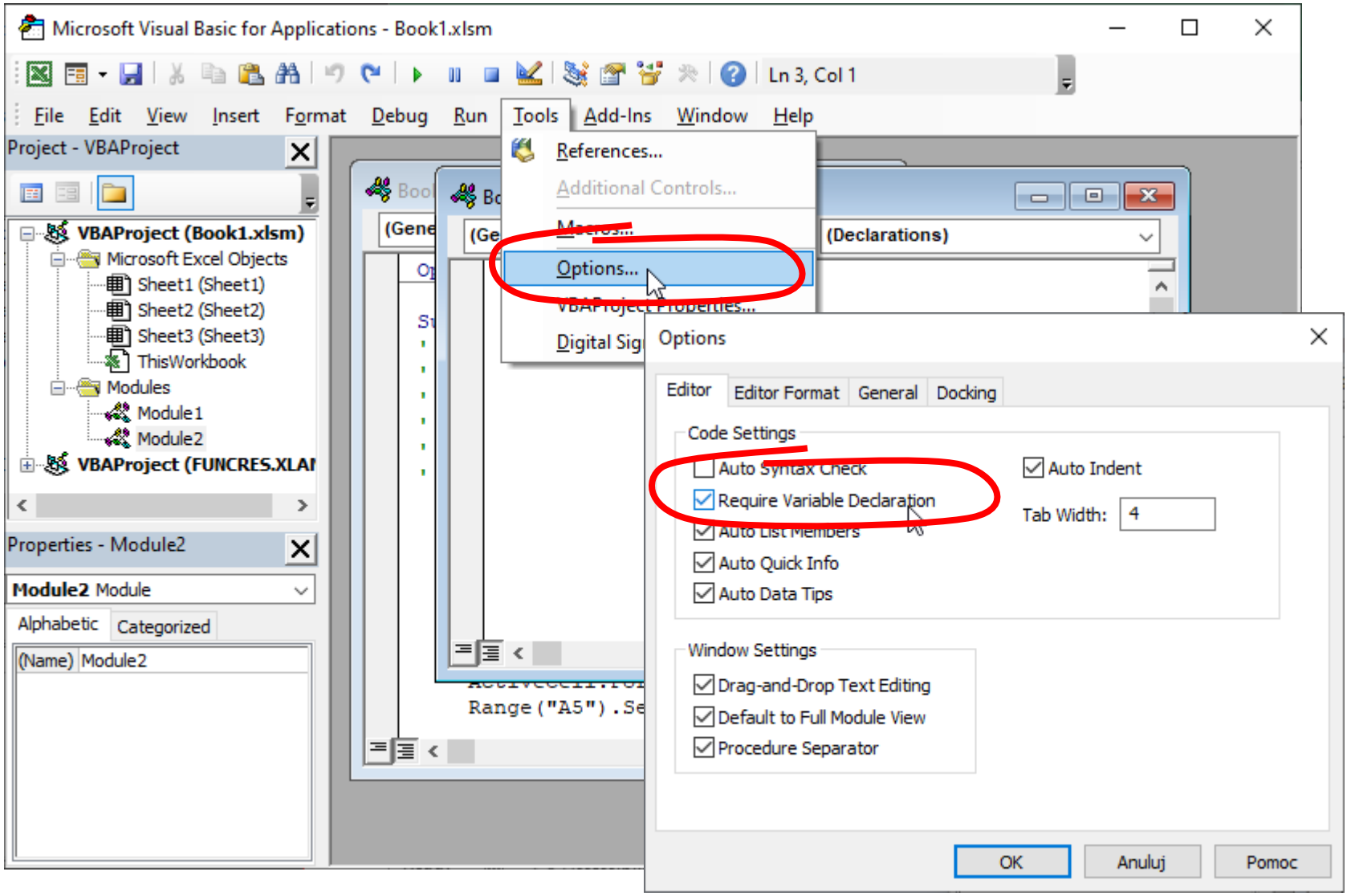


Option Explicit

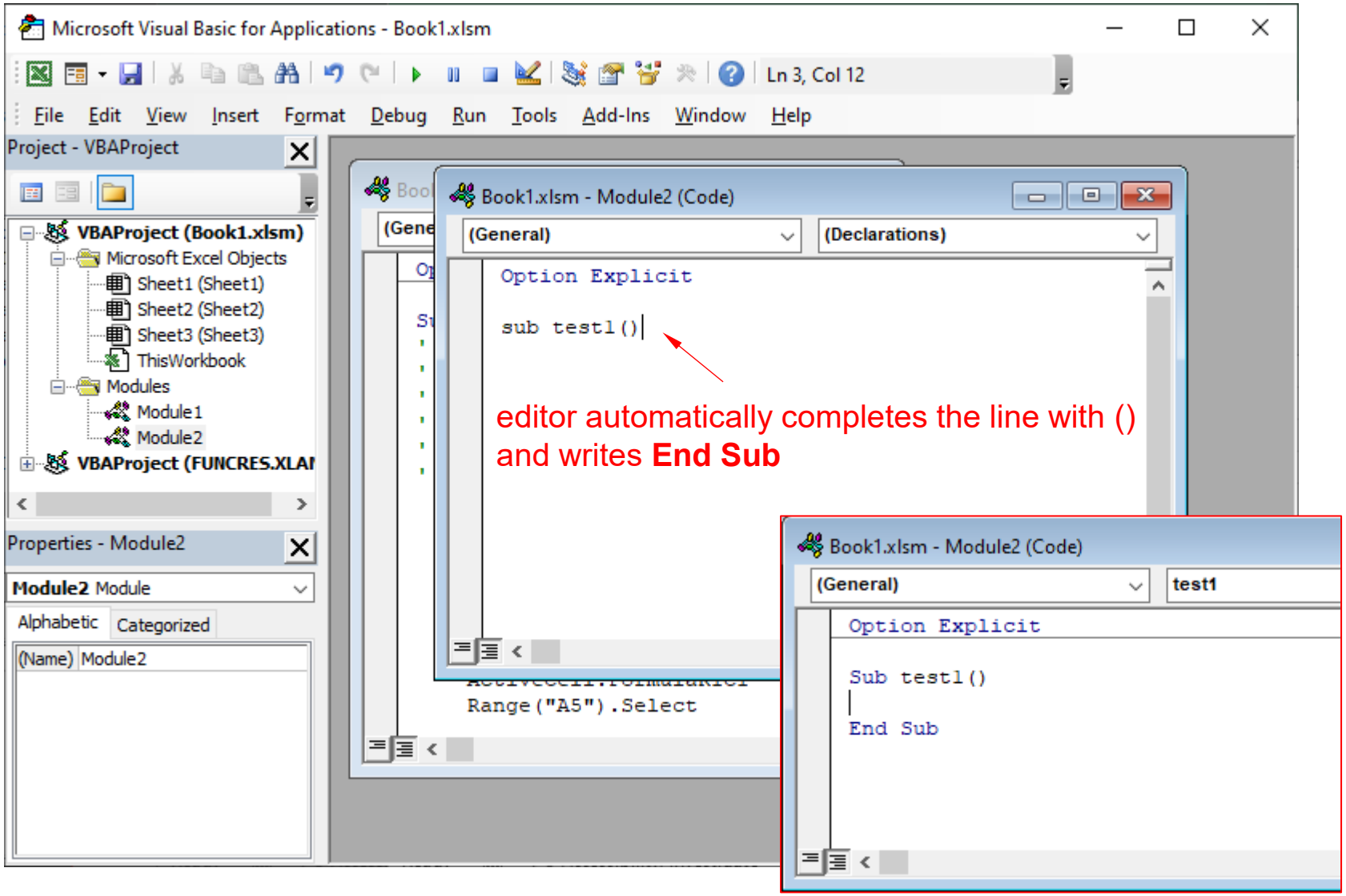


docs.microsoft.com
When **Option Explicit** appears in a module, you must explicitly declare all variables by using the Dim, Private, Public, ReDim, or Static statements. If you attempt to use an undeclared variable name, an error occurs at compile time.

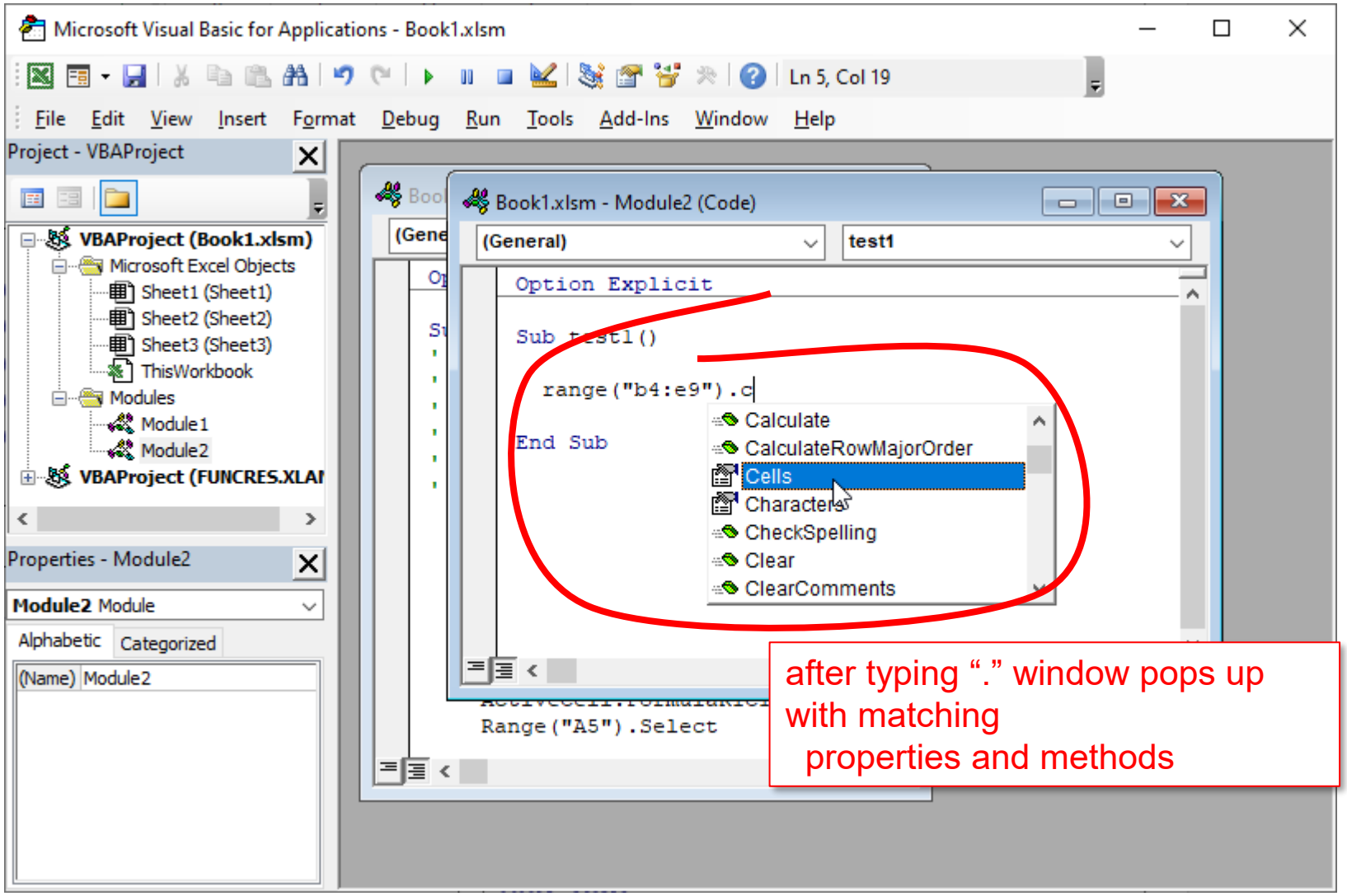
Option Explicit



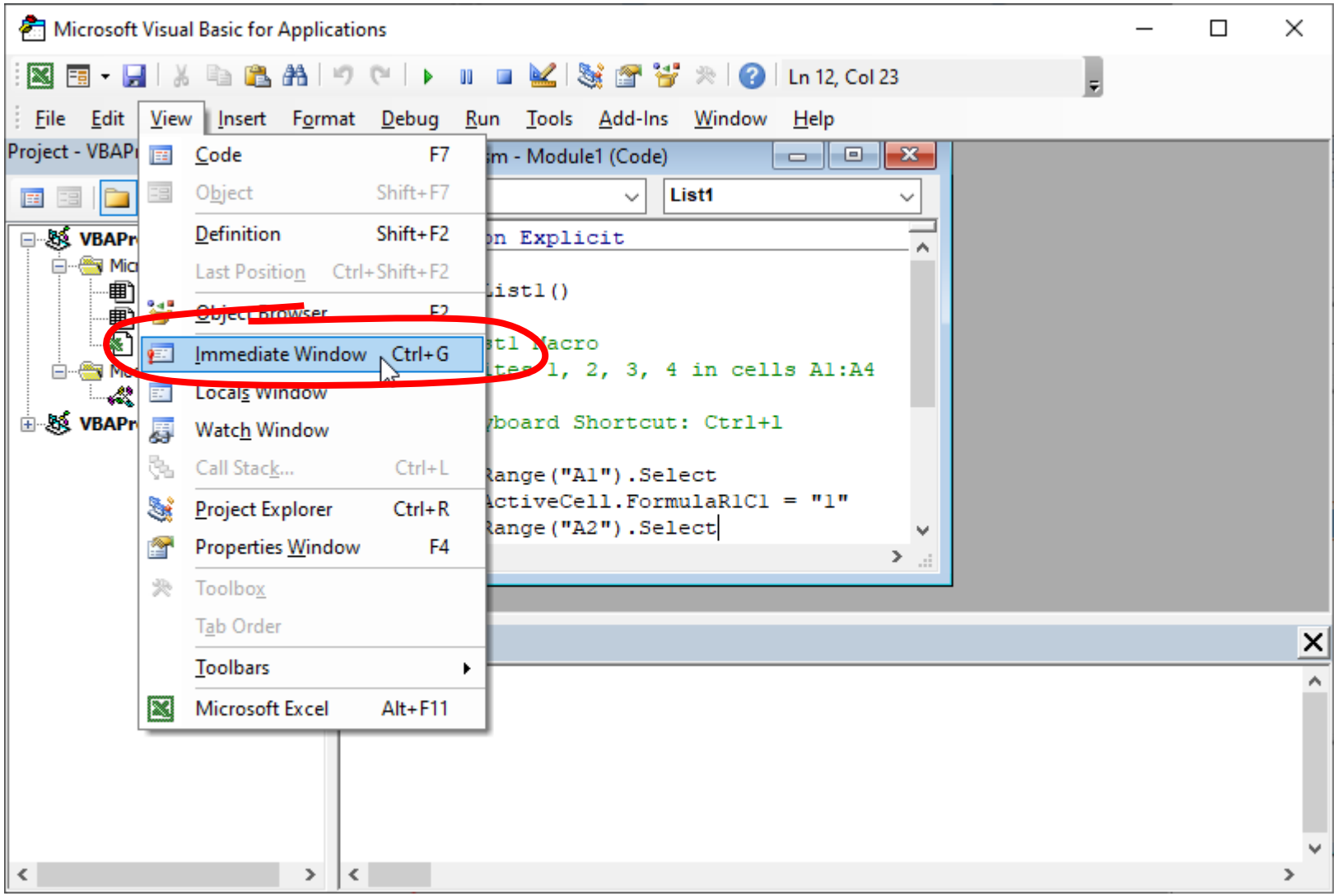
Editing macros



Editing macros



Working with VBA – Immediate Window



Working with VBA – Immediate Window