Biological Big Data Visualization &Integration *using Excel*

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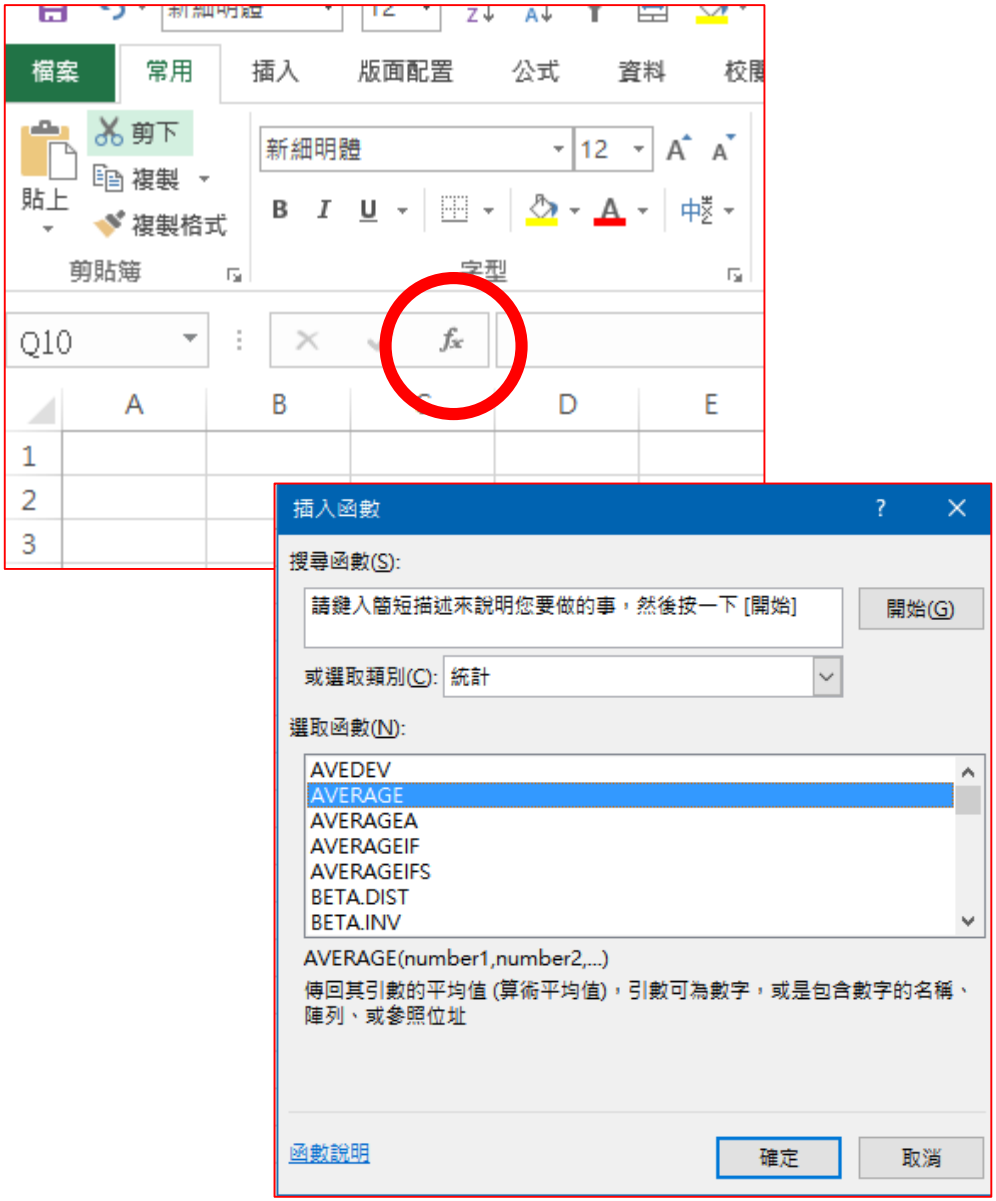
Outline

- Heatmap & PivotTable
- Introduction to VBA
- Build a Excel Macro
- Editing a Excel Macro by Visual Basic

Visual Basic for Application

- Visual Basic for Microsoft Office
  - Excel, Office, PowerPoint, Access …
  - Note that a VBA program is only executable in Office.
- Object-oriented concept, e.g., in Office Excel,
  - WorkBook
    - WorkSheet
      - Range
- We will focus on VBA for Excel in this chapter.

- Function
  - = SUM(A1, A2, A3)
  - = AVERAGE(A:A)
- Apply rules



Creating bar chart of your data (1/2)

	A	B
1	GeneID	Expression_level
2	PAX2	76
3	KCNIP2	85
4	HPS6	61
5	CELF2	99
6	FAM160B1	96
7	ATRNL1	72
8	GFRA1	95
9	C10orf82	0
10	EIF3A	13
11	GRK5	32
12	FAM175B	19
13	MKI67	20
14	UCMA	29
15	DPYSL4	16
16	STK32C-LRRC27	33
17	BEND7	17
18	PTPLA	13
19	STAM	29
20	ARL5B	5

	A	B
1	GeneID	Expression_level
2	PAX2	76
3	KCNIP2	85
4	HPS6	61
5	CELF2	99
6	FAM160B1	96
7	ATRNL1	72
8	GFRA1	95
9	C10orf82	0
10	EIF3A	13
11	GRK5	32
12	FAM175B	19
13	MKI67	20
14	UCMA	29
15	DPYSL4	16
16	STK32C-LRRC27	33
17	BEND7	17
18	PTPLA	13
19	STAM	29
20	ARL5B	5

Creating color gradients of your data (2/2)

	A	B
1	GeneID	Expression_level
2	PAX2	76
3	KCNIP2	85
4	HPS6	61
5	CELF2	99
6	FAM160B1	96
7	ATRNL1	72
8	GFRA1	95
9	C10orf82	0
10	EIF3A	13
11	GRK5	32
12	FAM175B	19
13	MKI67	20
14	UCMA	29
15	DPYSL4	16
16	STK32C-LRRC27	33
17	BEND7	17
18	PTPLA	13
19	STAM	29
20	ARL5B	5

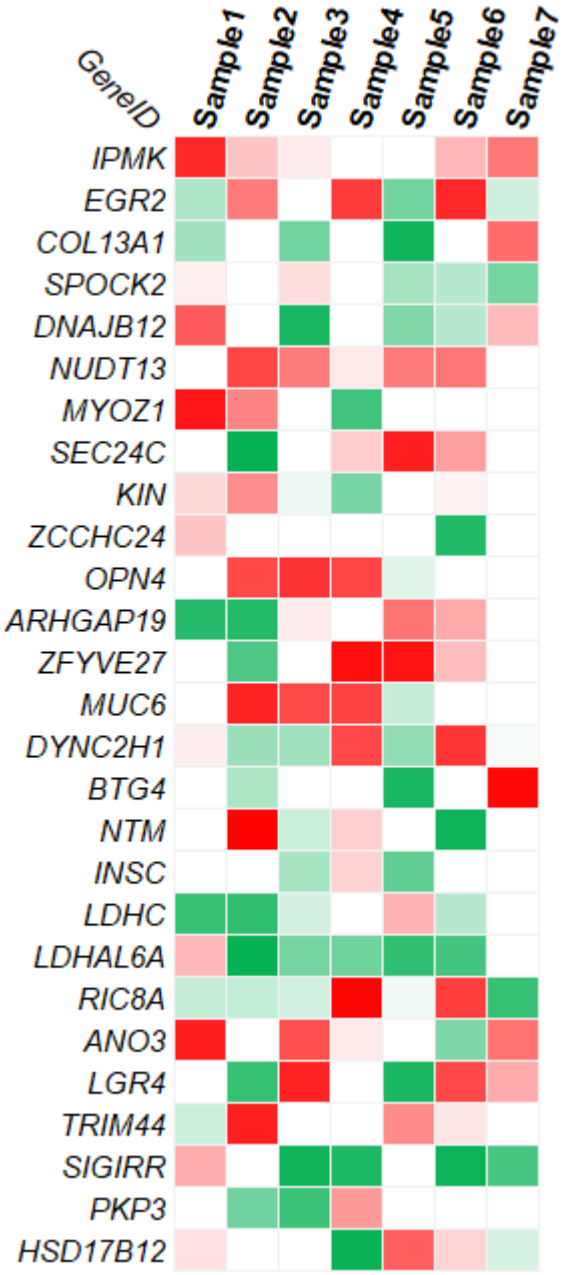
	A	B
1	GeneID	Expression_level
2	PAX2	76
3	KCNIP2	85
4	HPS6	61
5	CELF2	99
6	FAM160B1	96
7	ATRNL1	72
8	GFRA1	95
9	C10orf82	0
10	EIF3A	13
11	GRK5	32
12	FAM175B	19
13	MKI67	20
14	UCMA	29
15	DPYSL4	16
16	STK32C-LRRC27	33
17	BEND7	17
18	PTPLA	13
19	STAM	29
20	ARL5B	5

02_input - stu.xlsx

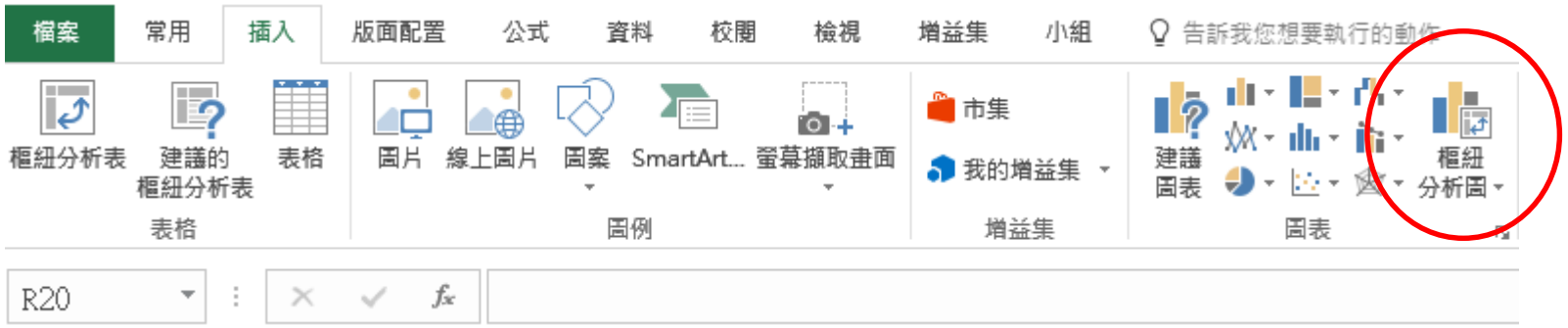
Exercise1: create your own heatmap

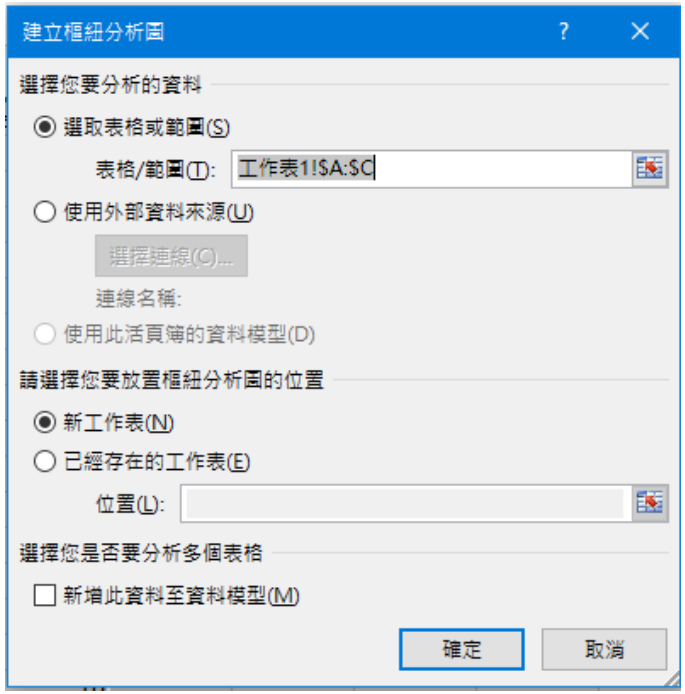
	A	B	C	D	E	F	G	H
1	GeneID	Sample1	Sample2	Sample3	Sample4	Sample5	Sample6	Sample7
2	IPMK	85	23	8	0	0	29	53
3	EGR2	-32	52	0	77	-55	85	-19
4	COL13A1	-36	0	-55	0	-94	0	58
5	SPOCK2	6	0	13	0	-35	-29	-54
6	DNAJB12	65	0	-90	0	-49	-29	27
7	NUDT13	0	73	52	9	52	54	0
8	MYOZ1	92	48	0	-74	0	0	0
9	SEC24C	0	-98	0	20	88	38	0
10	KIN	15	45	-7	-52	0	5	0
11	ZCCHC24	23	0	0	0	0	-87	0
12	OPN4	0	72	80	73	-12	0	0
13	ARHGAP19	-85	-86	8	0	55	34	0
14	ZFYVE27	0	-69	0	95	93	26	0
15	MUC6	0	87	71	74	-23	0	0
16	DYNC2H1	7	-39	-37	72	-42	79	-3
17	BTG4	0	-32	0	0	-90	0	97
18	NTM	0	99	-21	19	0	-95	0
19	INSC	0	0	-35	18	-62	0	0
20	LDHC	-79	-81	-18	0	30	-29	0

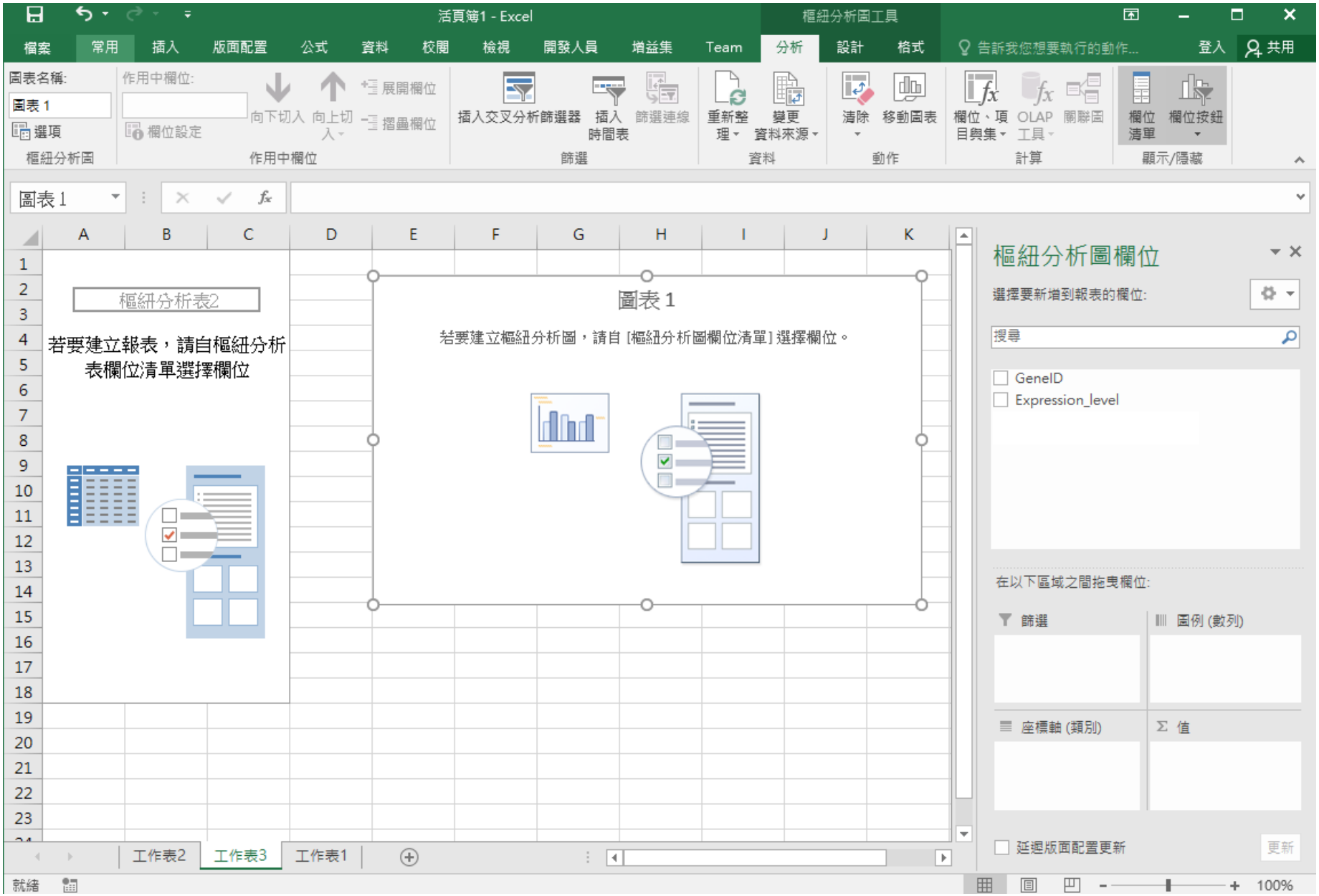
- Make numbers disappear



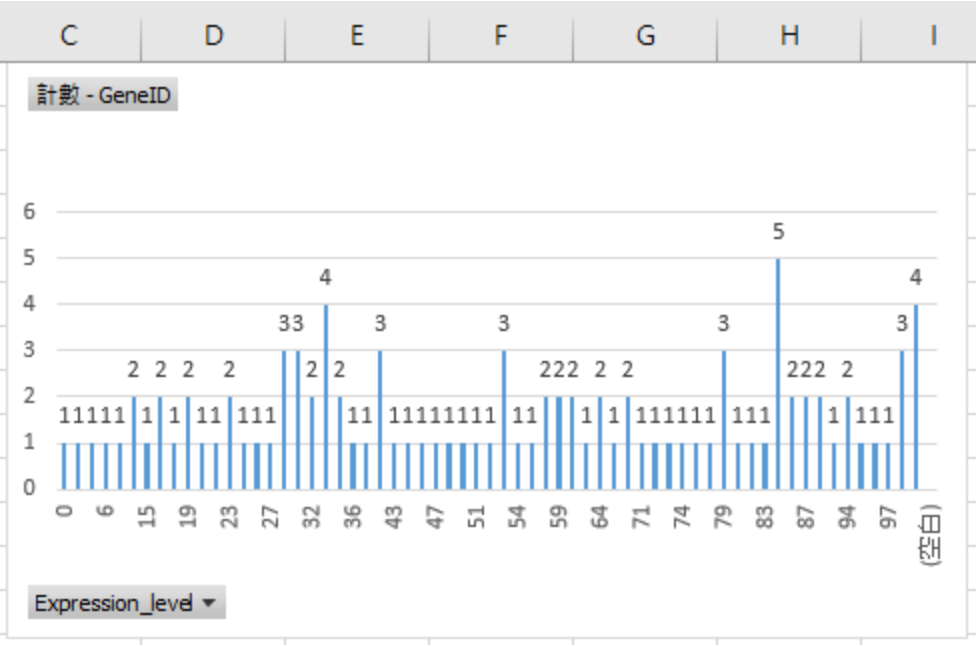
Pivot (1/2)


檔案
常用
插入
版面配置
公式
資料
校閱
檢視
增益集
小組
告訴我您想要執行的動作
樞紐分析表
建議的樞紐分析表
表格
圖片
線上圖片
圖案
SmartArt...
螢幕擷取畫面
市集
我的增益集
建議圖表
樞紐分析圖
表格
圖例
增益集
圖表
R20


建立樞紐分析圖
選擇您要分析的資料
選取表格或範圍(S)
表格/範圍(T): 工作表1!$A:$C
使用外部資料來源(U)
選擇連線(C)...
連線名稱:
使用此活頁簿的資料模型(D)
請選擇您要放置樞紐分析圖的位置
新工作表(N)
已經存在的工作表(E)
位置(L):
選擇您是否要分析多個表格
新增此資料至資料模型(M)
確定
取消


活頁簿1 - Excel
樞紐分析圖工具
檔案
常用
插入
版面配置
公式
資料
校閱
檢視
開發人員
增益集
Team
分析
設計
格式
告訴我您想要執行的動作...
登入
共用
圖表名稱:
圖表 1
選項
樞紐分析圖
作用中欄位:
欄位設定
向下切入
向上切入
展開欄位
摺疊欄位
作用中欄位
插入交叉分析篩選器
插入時間表
篩選連線
篩選
重新整理
變更資料來源
資料
清除
移動圖表
動作
欄位、項目與集
OLAP 工具
關聯圖
計算
欄位清單
欄位按鈕
顯示/隱藏
圖表 1
樞紐分析表2
若要建立報表，請自樞紐分析表欄位清單選擇欄位
圖表 1
若要建立樞紐分析圖，請自 [樞紐分析圖欄位清單] 選擇欄位。
樞紐分析圖欄位
選擇要新增到報表的欄位:
搜尋
GeneID
Expression_level
在以下區域之間拖曳欄位:
篩選
圖例 (數列)
座標軸 (類別)
值
延遲版面配置更新
更新
工作表2
工作表3
工作表1
就緒
100%

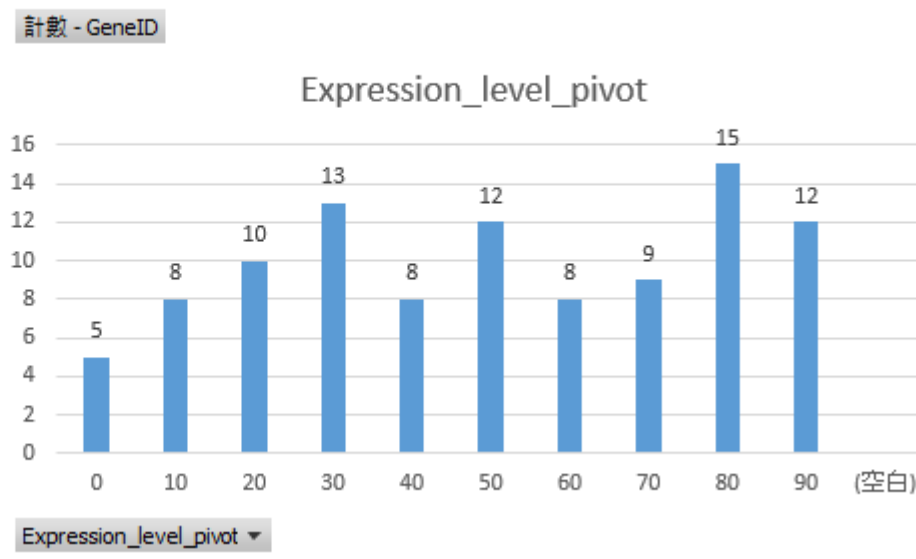
	A	B
1	列標籤	計數 - GeneID
2	0	1
3	1	1
4	5	1
5	6	1
6	8	1
7	13	2
8	15	1
9	16	2
10	17	1
11	19	2
12	20	1
13	22	1



Exercise2: Pivot

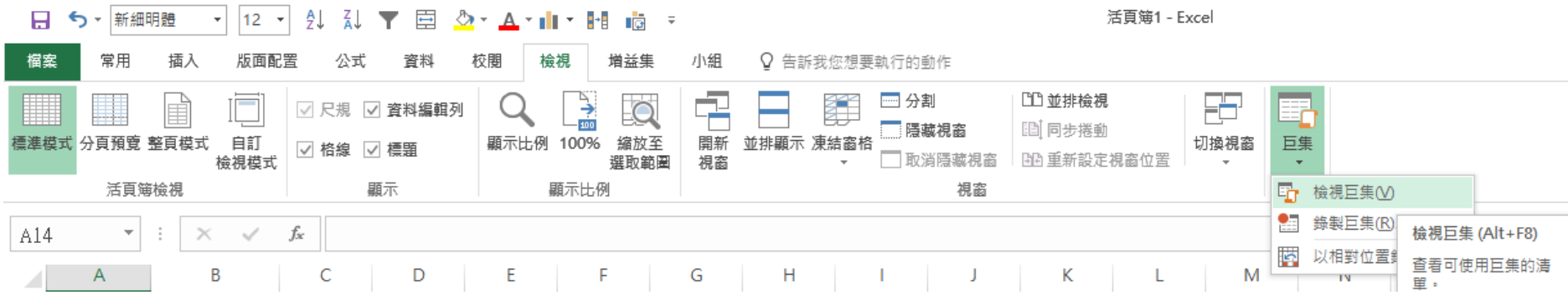
	A	B
1	GeneID	Expression_level
2	PAX2	76
3	KCNIP2	85
4	HPS6	61
5	CELF2	99
6	FAM160B1	96
7	ATRNL1	72
8	GFRA1	95
9	C10orf82	0
10	EIF3A	13
11	GRK5	32
12	FAM175B	19
13	MKI67	20
14	UCMA	29
15	DPYSL4	16
16	STK32C-LRRC27	33
17	BEND7	17
18	PTPLA	13
19	STAM	29
20	ARL5B	5

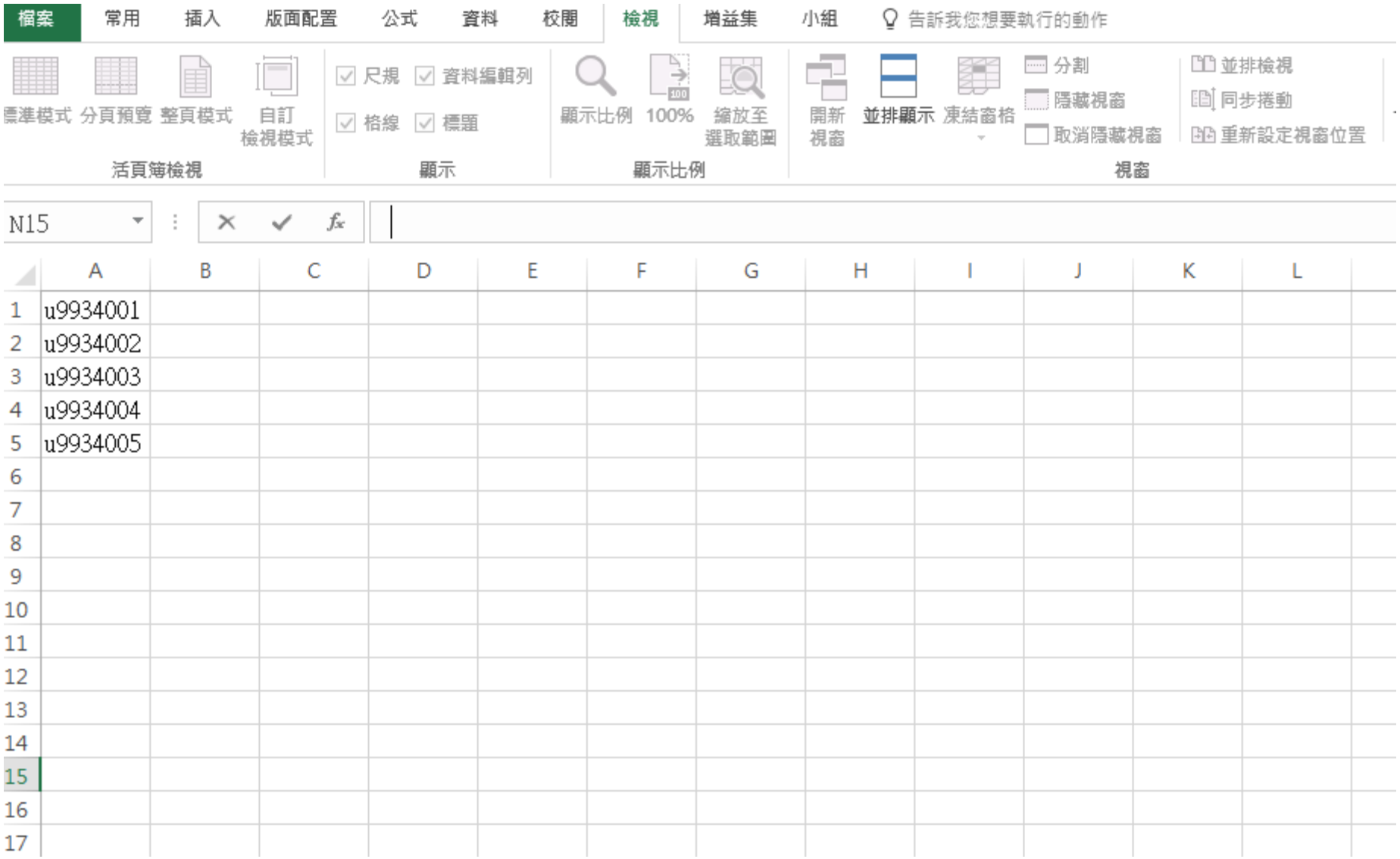
	A	B
1	列標籤	計數 - GeneID
2	0	5
3	10	8
4	20	10
5	30	13
6	40	8
7	50	12
8	60	8
9	70	9
10	80	15
11	90	12
12	(空白)	
13	總計	100



The first Excel Macro

- What is a macro?
  - Record a macro.

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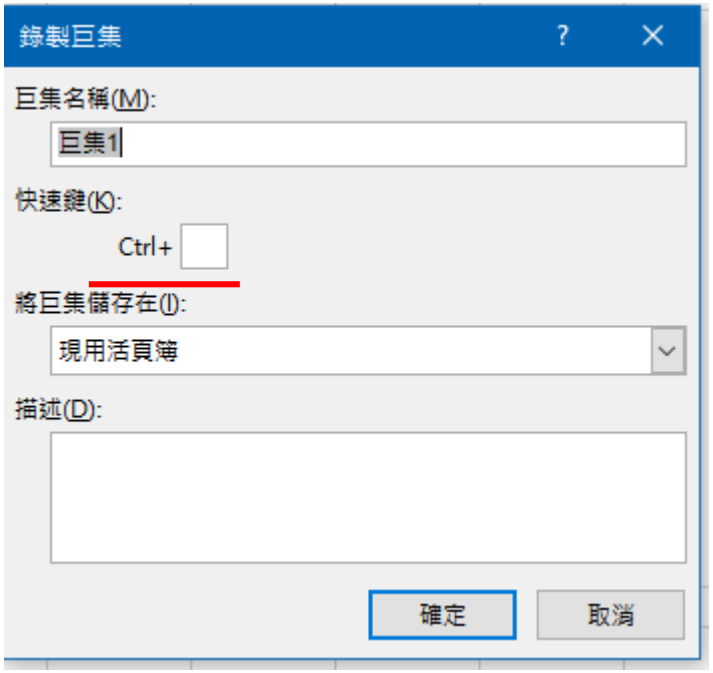
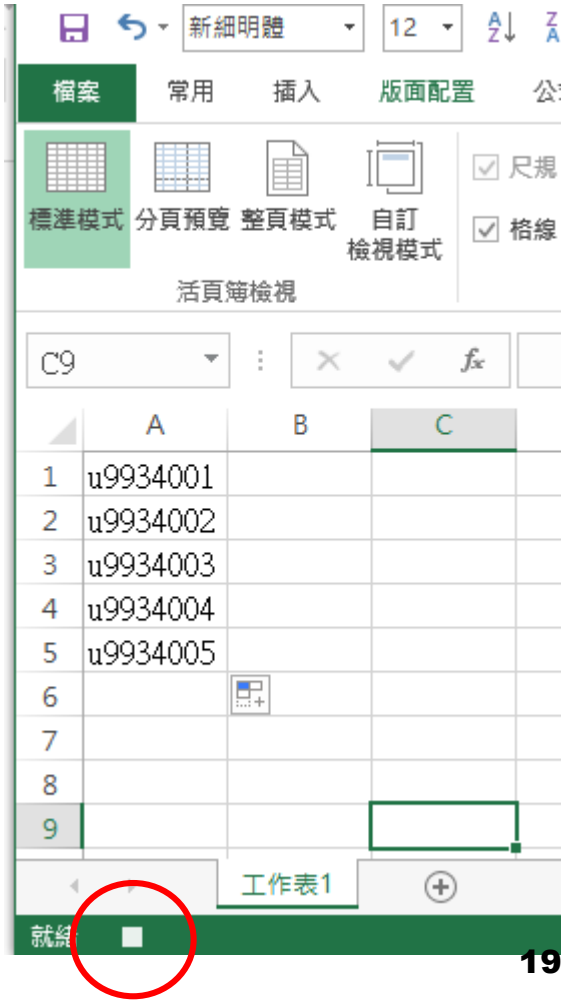
告訴我您想要執行的動作
標準模式
分頁預覽
整頁模式
自訂檢視模式
活頁簿檢視
尺規
資料編輯列
格線
標題
顯示
顯示比例
100%
縮放至選取範圍
顯示比例
開新視窗
並排顯示
凍結窗格
分割
隱藏視窗
取消隱藏視窗
並排檢視
同步捲動
重新設定視窗位置
視窗
N15
A B C D E F G H I J K L
1 u9934001
2 u9934002
3 u9934003
4 u9934004
5 u9934005
6 7 8 9 10 11 12 13 14 15 16 17

Record a Macro

- Just like a video recording



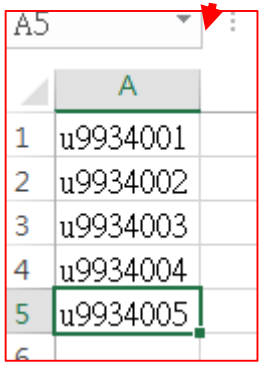


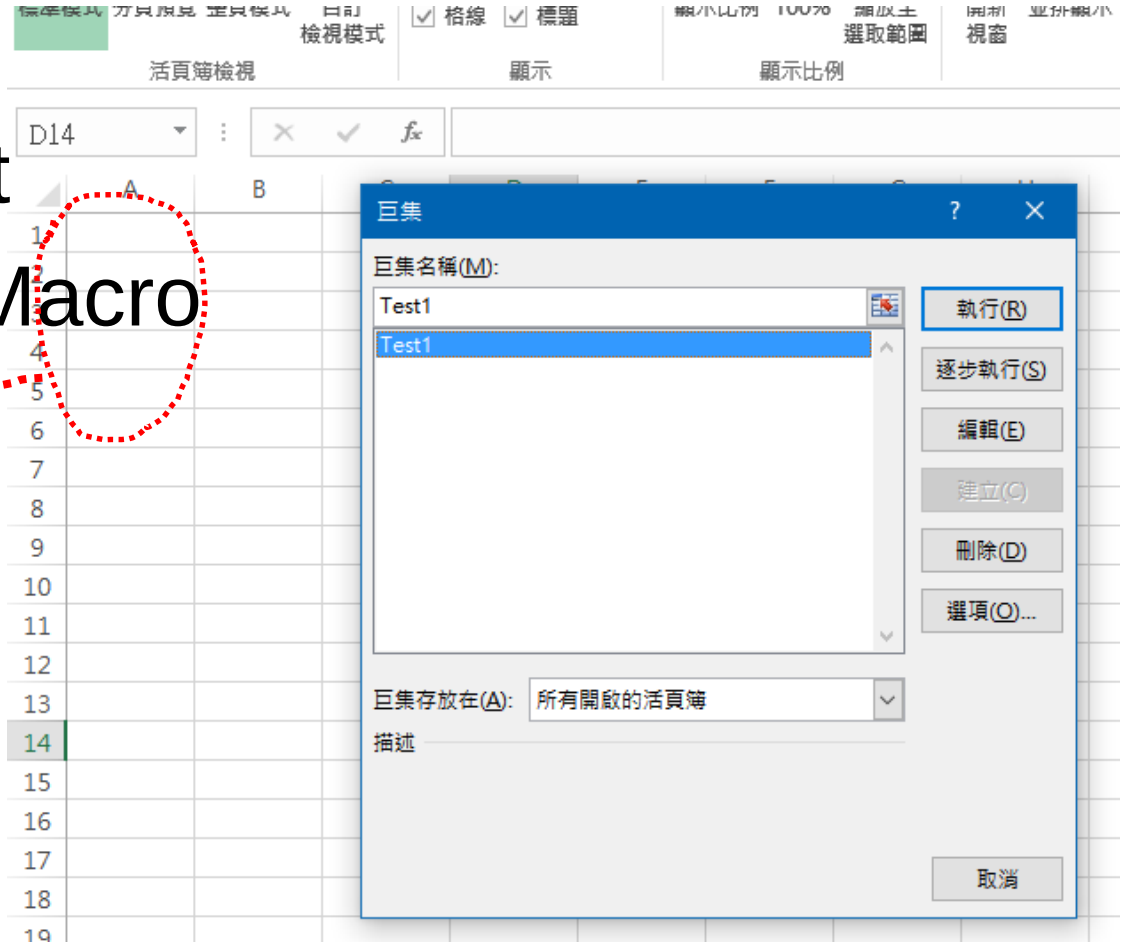
Record a Macro

- Click "start record"
- Click A1 cell
- enter u99034001~ u99034005 each cell
- click "stop record"

Execute your Macro

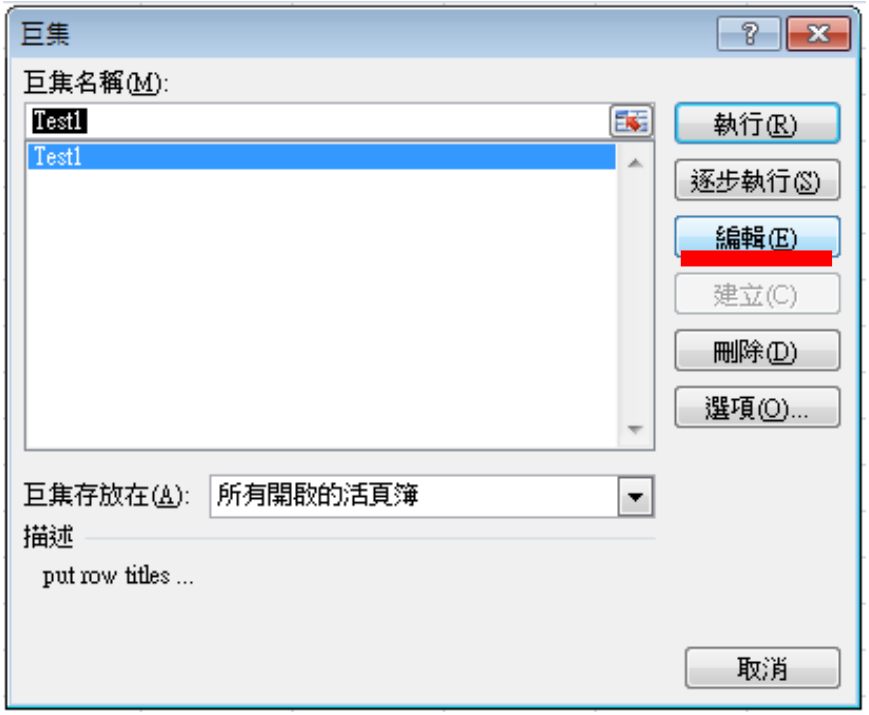
- clear A1~A5 first
- execute Test1 Macro



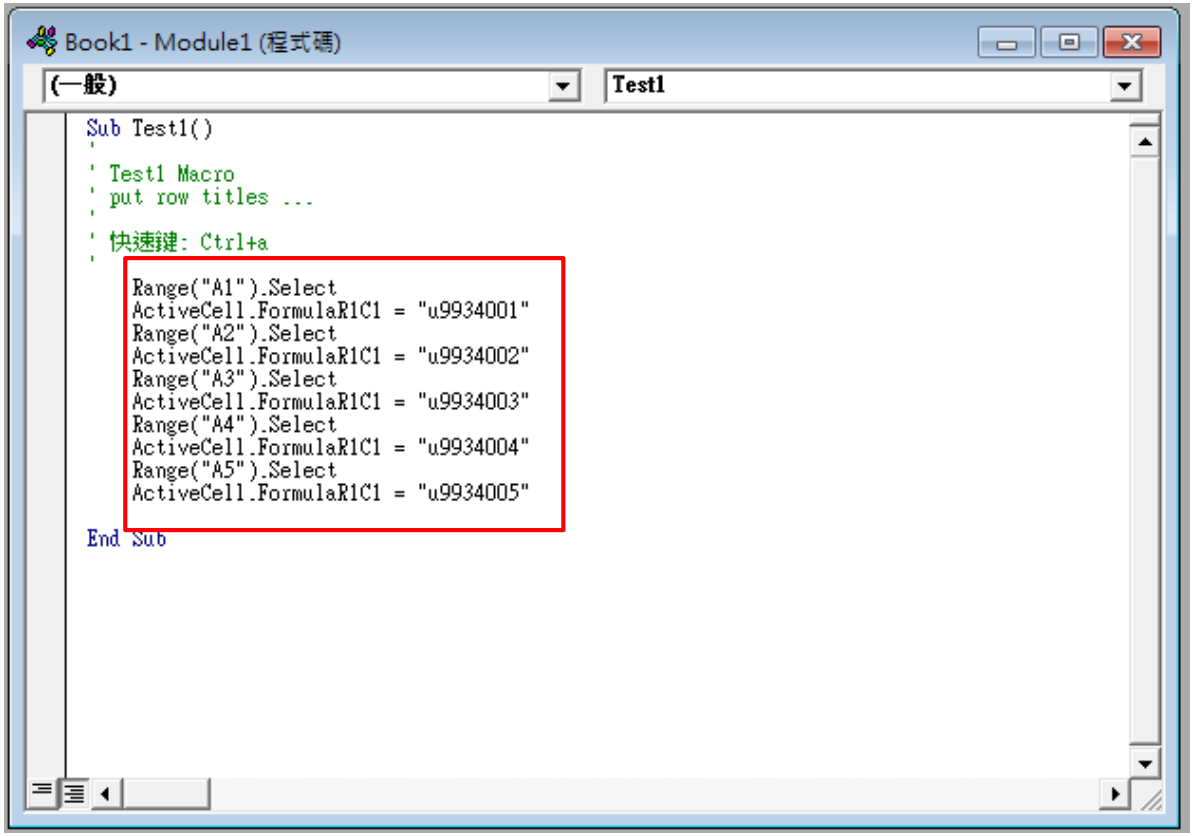


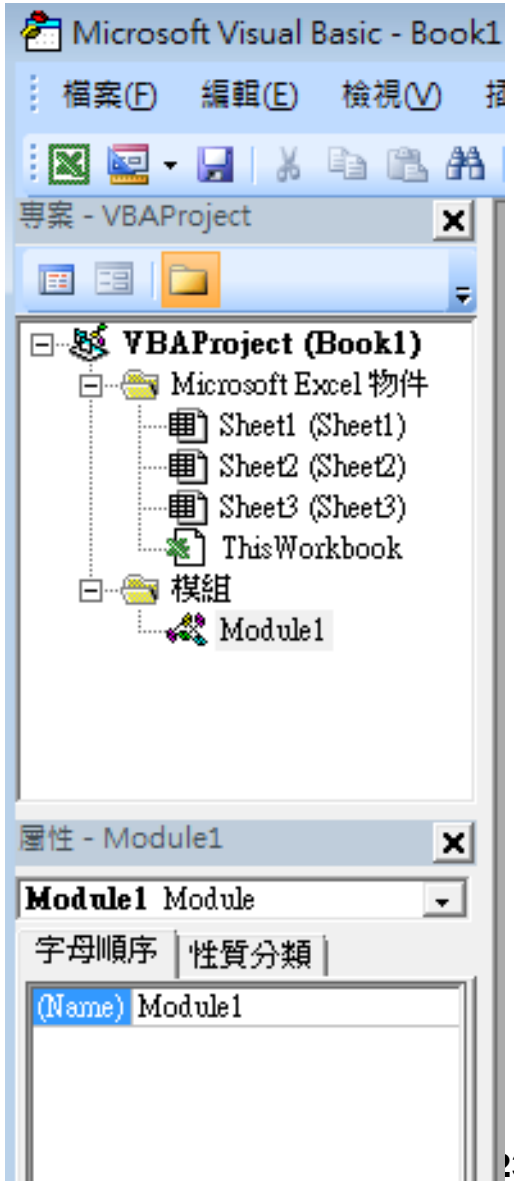
Execute & Edit

- Execute
  - via menu
  - via shortcut key
    (例如 Ctril + $)

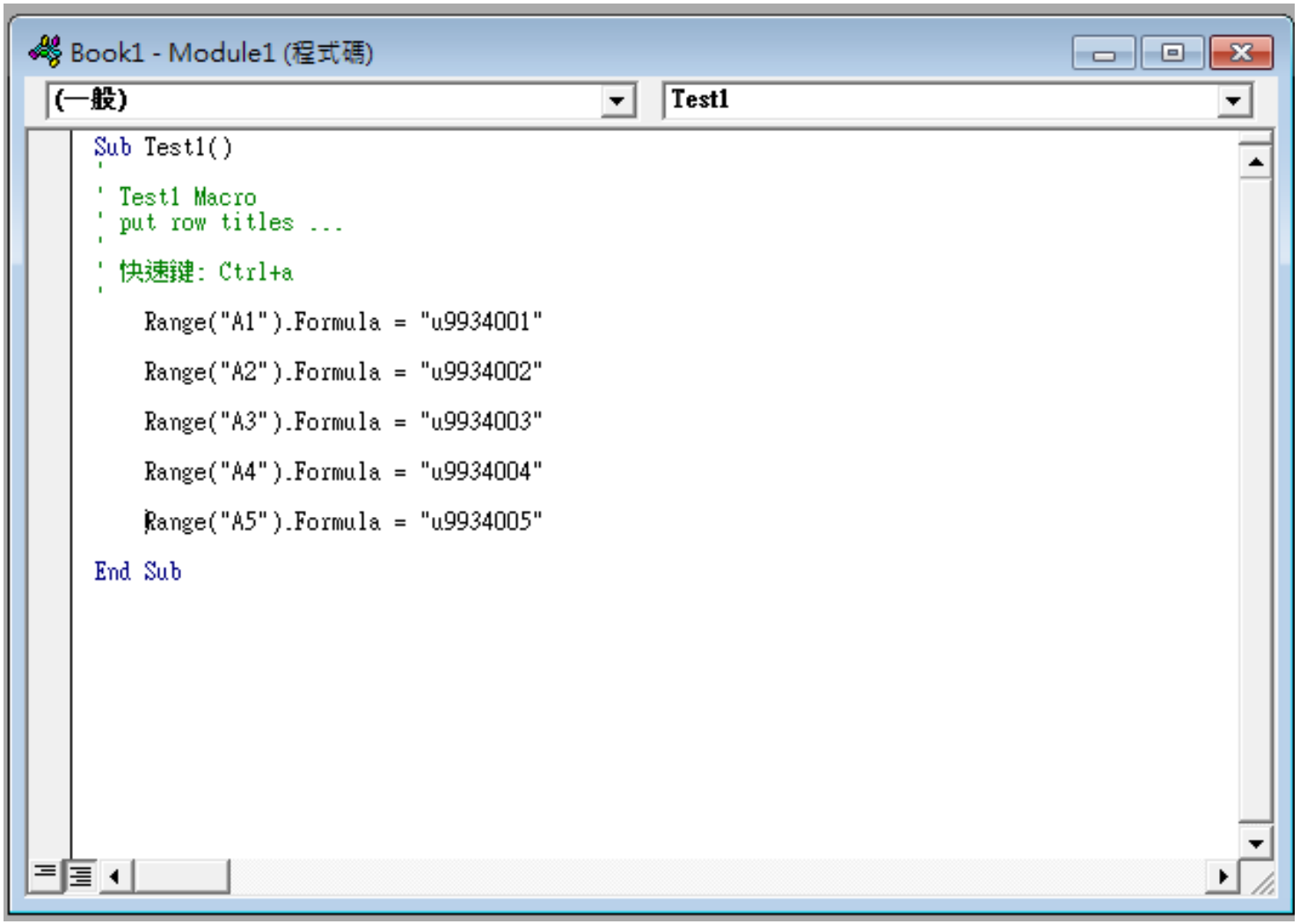


VBA Interface





Code


Book1 - Module1 (程式碼)
(一般)
Test1
Sub Test1()
'
' Test1 Macro
' put row titles ...
'
' 快速鍵: Ctrl+a
'
Range("A1").Formula = "u9934001"
Range("A2").Formula = "u9934002"
Range("A3").Formula = "u9934003"
Range("A4").Formula = "u9934004"
Range("A5").Formula = "u9934005"
End Sub

Exercise 3: Create the second Macro

- Try to add a script
- enter
- 80, 65, 72, 93, 58
- to cell B1~B5
- execute Test2 Macro

活頁簿1 - Module1 (程式碼)

(一般)

```
Sub Test1()
'
' Test1 巨集
'
' 快速鍵: Ctrl+a
    Range("A1").Select
    ActiveCell.FormulaR1C1 = "u9934001"
    Range("A2").Select
    ActiveCell.FormulaR1C1 = "u9934002"
    Range("A3").Select
    ActiveCell.FormulaR1C1 = "u9934003"
    Range("A4").Select
    ActiveCell.FormulaR1C1 = "u9934004"
    Range("A5").Select
    ActiveCell.FormulaR1C1 = "u9934005"

End Sub

Sub Test2()
'
' Test2 巨集
'
' 快速鍵: Ctrl+b
    Range("B1").Select
    ActiveCell.FormulaR1C1 = "80"
    Range("B2").Select
    ActiveCell.FormulaR1C1 = "65"
    Range("B3").Select
    ActiveCell.FormulaR1C1 = "72"
    Range("B4").Select
    ActiveCell.FormulaR1C1 = "93"
    Range("B5").Select
    ActiveCell.FormulaR1C1 = "58"

End Sub
```

Range("B1".Select)
ActiveCell.FormulaR1C1=

	A	B
1	u9934001	80
2	u9934002	65
3	u9934003	72
4	u9934004	93
5	u9934005	58

How to Edit an Excel Macro

- Range("A1").Value = 0
  - Worksheets("Sheet1").Range("A1").Value= 0
  - Workbooks("Book1").Worksheets("Sheet1").Range("A1").Value=0

  - Workbooks(“Book1”).Close
    - close Book1.xls

  - Worksheets("Sheet2").Activate
    - activate Sheet2

Add Sub: ave_compute()

Example

File01.xlsm - Module1 (程式碼)

(一般) ave_compute

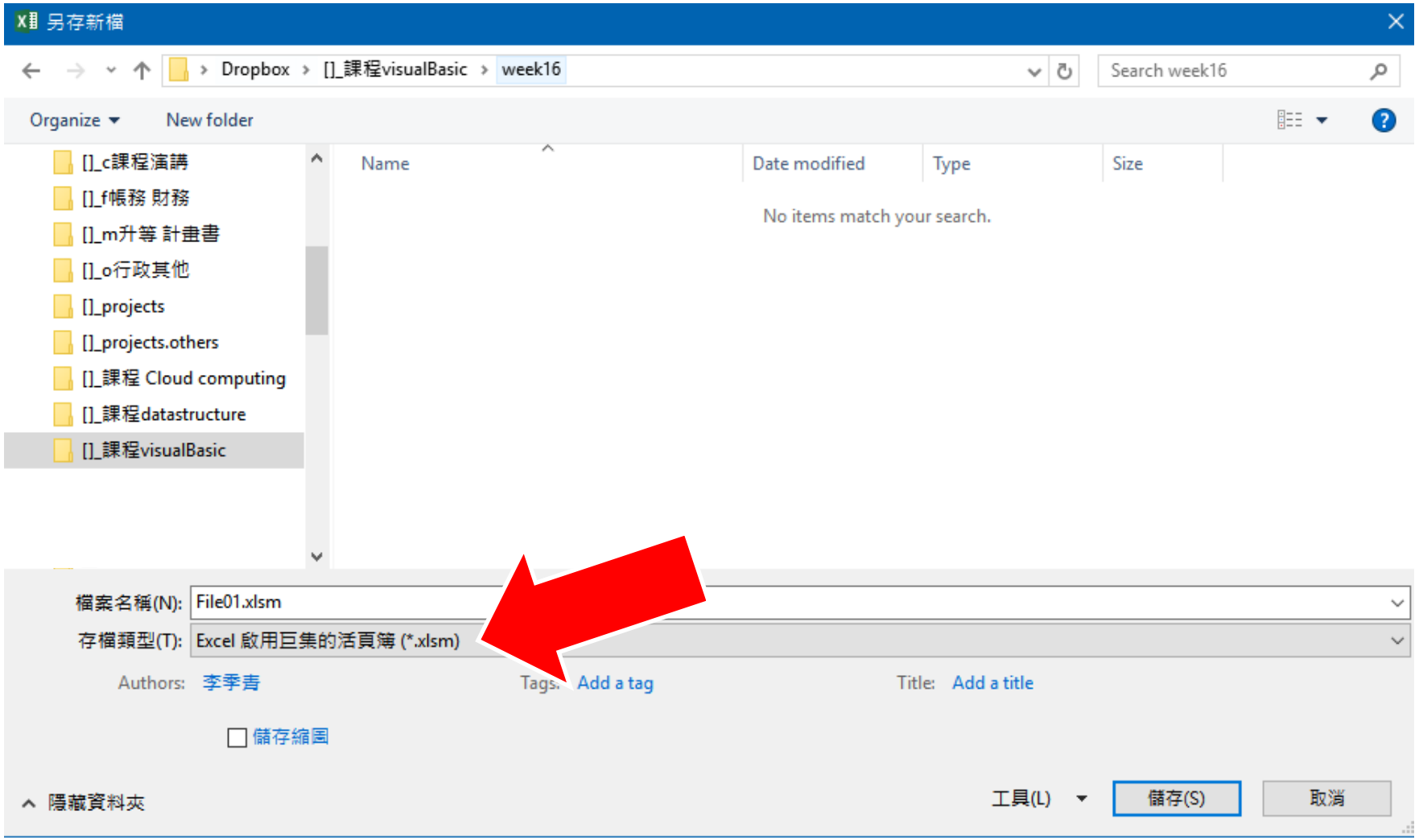
```
    Range("A5").Select
    ActiveCell.FormulaR1C1 = "u9934005"

End Sub

Sub Test2()
'
' Test2 巨集
'
' 快速鍵: Ctrl+b
    Range("B1").Select
    ActiveCell.FormulaR1C1 = "80"
    Range("B2").Select
    ActiveCell.FormulaR1C1 = "65"
    Range("B3").Select
    ActiveCell.FormulaR1C1 = "72"
    Range("B4").Select
    ActiveCell.FormulaR1C1 = "93"
    Range("B5").Select
    ActiveCell.FormulaR1C1 = "58"

End Sub
```

```
Public Sub ave_compute()

    Dim k, sum As Integer
    sum = 0
    For k = 1 To 5
    sum = sum + Cells(k, 2).Value
    Next
    Cells(k, 2).Value = sum / (k - 1)

End Sub
```

Cells(K, 2)

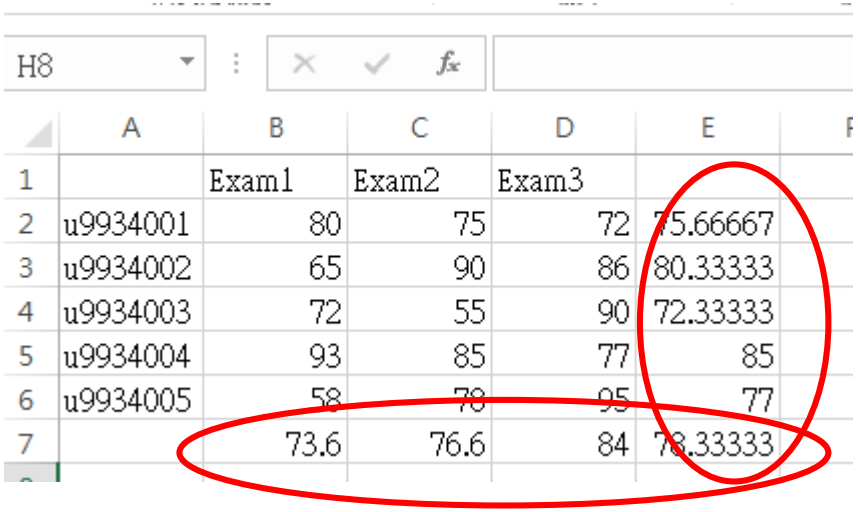
	A	B	C
1	u9934001	80	
2	u9934002	65	
3	u9934003	72	
4	u9934004	93	
5	u9934005	58	
6		73.6	
7			

Save your sheet with Macro



Exercise 4

- list Exam1~Exam3 automatically
- Compute “average”



H8

	A	B	C	D	E
1		Exam1	Exam2	Exam3	
2	u9934001	80	75	72	75.66667
3	u9934002	65	90	86	80.33333
4	u9934003	72	55	90	72.33333
5	u9934004	93	85	77	85
6	u9934005	58	78	95	77
7		73.6	76.6	84	78.33333