Lab 03: Advanced Business Analytics 1

Learning Outcomes

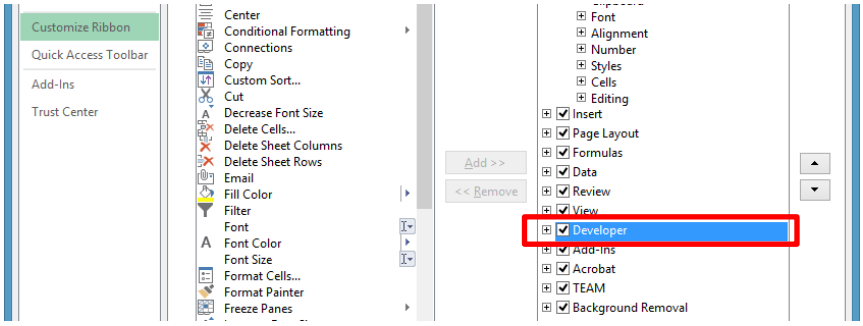
1. Distinguish the relations between Excel Macros and Excel VBA.
2. Learn to construct VBA programs by Macro recording.
3. Learn to construct or modify VBA programs using VB Editor.
4. Identify the three ways to run VBA programs (or known as Macros).
5. Understand how VBA works with business applications.

Introduction

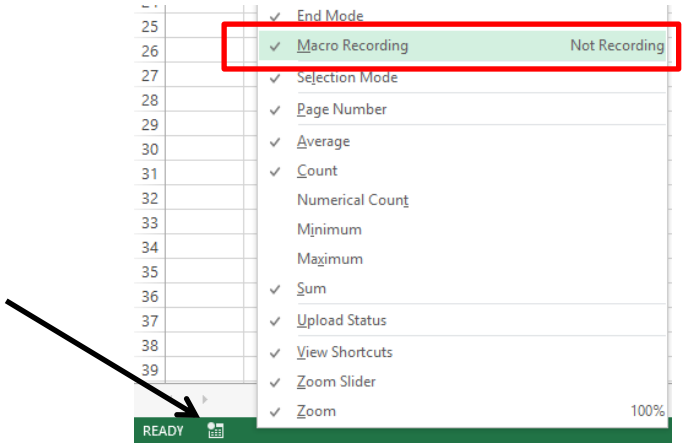
In this laboratory, you will learn VBA (Visual Basics for Applications) as an advanced way to reduce your time and workload on repeated tasks. More specifically, you will learn the various ways to construct and run a VBA program.

Task 1: Excel setting to enable Macros and VBA programs.

1. Select **FILE > Options** in **Ribbon**.
2. In **Customize Ribbon**, check **Developer** on the right hand side of the list box.



3. Click **OK** button to confirm.
4. Right-click on the status bar. Check **Macro Recording** on the popup menu.



Task 2: Construct a VBA program by Macro Recording; Run a VBA program by Run Macros

By using Excel Macro Recording, user interactions will be recorded as VBA program code. And the VBA program (or known as Macro) can be replayed later. So it is very useful if the interactions have to be repeated many times. Now you are going to record a Macro that can plot a stock chart.

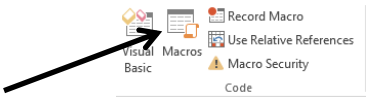
1. Open the file **lab03_stock_slot.xlsm** that can be downloaded from CANVAS.

   There are two worksheets, namely 3988.HK and 0005.HK, we will record the steps on 3988.HK worksheet and later we will replay the steps for 0005.HK.

2. Select **3988.HK** worksheet.
3. Click **Record Macro** button ( ) in the status bar to begin the recording process.
4. Type **My_First_Macro** as the **Macro name** in the popup dialog box. And then click **OK** button to confirm.
5. Change the names in **Row 1** as below:
   i) Open → opening price
   ii) High → high price
   iii) Low → low price
   iv) Close → closing price
6. Select **Columns A to E**.
7. Click **INSERT > Insert Line Chart**
8. Click **Stop Recording** button ( ) in the status bar to finish the recording process.

Now, we are going to replay the steps.

9. Delete the chart.
10. Select **DEVELOPER > Macros**.

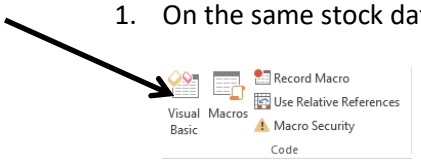


11. Choose **My_First_Macro** and click **Run** button to replay the Macro.

Task 3: Construct a VBA program by VB Editor; Run a VBA program by clicking a button

In this part, you are going to develop a VBA program that calculates the daily stock closing price change.

1. On the same stock data worksheet, select **DEVELOPER > Visual Basic** in the Ribbon.



A new window pops up, and this window is called **Visual Basic Editor (VBE)**. In VBE, you can create your own programming code for a button, list box, menu, etc.

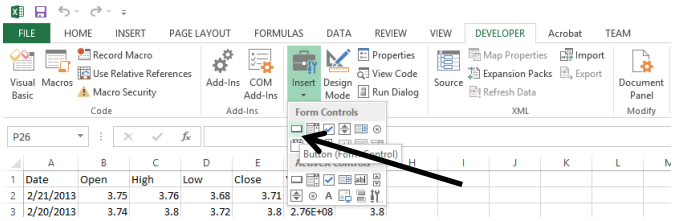
2. In VBE, select **Insert > Module** in the menu.
3. Now you can develop a VBA program in the Module window. As a beginner, copy the following VBA program code in the VBE Module window:

```
Public Sub Calculate_Change()
    Dim i As Long

    Cells(1, "H").Value = "Change"

    i = 2
    Do Until IsEmpty(Cells(i + 1, "G"))
        Cells(i, "H").Value = Cells(i, "G").Value - Cells(i + 1, "G").Value
        i = i + 1
    Loop
End Sub
```

4. Go back to the stock data worksheet window.
5. Insert a **Button** to call the VBA program in Step 3.
   i) Select **DEVELOPER** in **Ribbon**.
   ii) Select **Insert > Button**.



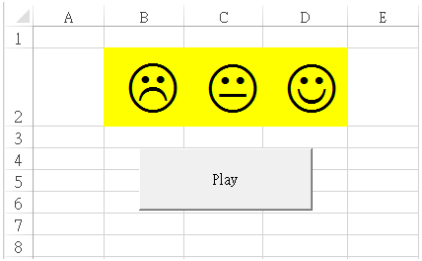
   iii) Use the mouse to drag a rectangular shape in order to create a button.
   iv) Choose **Calculate_Change** and click **OK** button.
6. Click the button to run the VBA program. You will have the similar result below.

	A	B	C	D	E	F	G	H	I	J	K
1	Date	Open	High	Low	Close	Volume	Adj Close	Change			
2	2/21/2013	3.75	3.76	3.68	3.71	4.33E+08	3.71	-0.09			
3	2/20/2013	3.74	3.8	3.72	3.8	2.76E+08	3.8	0.08	Button 1		
4	2/19/2013	3.82	3.84	3.72	3.72	1.99E+08	3.72	-0.09			
5	2/18/2013	3.81	3.83	3.77	3.81	2.12E+08	3.81	-0.01			
6	2/15/2013	3.83	3.85	3.8	3.82	1.8E+08	3.82	-0.01			
7	2/14/2013	3.79	3.83	3.76	3.83	2.5E+08	3.83	0.09			
8	2/13/2013	3.74	3.74	3.74	3.74	0	3.74	0			
9	2/12/2013	3.74	3.74	3.74	3.74	0	3.74	0			
10	2/11/2013	3.74	3.74	3.74	3.74	0	3.74	0			
11	2/8/2013	3.75	3.77	3.72	3.74	3.94E+08	3.74	-0.03			
12	2/7/2013	3.8	3.8	3.71	3.77	4.45E+08	3.77	-0.02			

Task 4: A Simple Game – Slot Machine

In this part, you are going to develop a simple slot machine game in VBA programming code. In this game, the user wins when s/he gets three identical pictures.

Sample outlook:



Instruction

1. Select the **Slot Machine** worksheet.
2. Copy the VBA program code (listed in the next page) to a Visual Basics Editor Module window.
3. Insert a button and assign the **PlaySlotMachine** VBA program to the button.

VBA Code

```
Declare PtrSafe Sub Sleep Lib "kernel32" (ByVal dwMilliseconds As LongPtr)
' Between each draw, stop (sleep) for some time to let people see the flashing
' effects.

Public Sub PlaySlotMachine()
    'Define the variable here
    Dim num1 As Integer, num2 As Integer, num3 As Integer
    Dim count As Integer
    Randomize Timer

    'draw the slot machine for 50 times
    For count = 1 To 50

        ' Randomly generate a number from 0-1 to num1 then *3 +1
        num1 = Int(Rnd() * 3 + 1)

        ' If num1=1 then return happy face in cell B2, elseif num1=2
        ' then return normal face in cell B2. '
        ' All other value will return unhappy face in cell B2

        If num1 = 1 Then
            Cells(2, "B").Value = "J"
        ElseIf num1 = 2 Then
            Cells(2, "B").Value = "K"
        Else
            Cells(2, "B").Value = "L"
        End If


        num2 = Int(Rnd() * 3 + 1)

        If num2 = 1 Then
            Cells(2, "C").Value = "J"
        ElseIf num2 = 2 Then
            Cells(2, "C").Value = "K"
        Else
            Cells(2, "C").Value = "L"
        End If


        num3 = Int(Rnd() * 3 + 1)

        If num3 = 1 Then
            Cells(2, "D").Value = "J"
        ElseIf num3 = 2 Then
            Cells(2, "D").Value = "K"
        Else
            Cells(2, "D").Value = "L"
        End If

        'The closer to the end of the draw, the slower are the flashing effects
        Sleep count * 4
    Next count

    'If num1=num2=num3, then will display message box
    If (num1 = num2 And num1 = num3) Then
        MsgBox "Congratulation! You are so lucky today"
    End If
End Sub
```

If you are using ***Mac version of Excel***, please make the below two statements as comment:

```
'Declare PtrSafe Sub Sleep Lib "kernel32" (ByVal dwMilliseconds As LongPtr)

'Sleep count * 4
```

These two lines are used to perform slow animation in Windows version Excel.

Challenge Questions [Optional]

Q1. Try to modify the VBA program of the slot machine so that:

1. The display message will be different for 3 happy faces, 3 normal faces and 3 sad faces.
2. The program will display another message when all three pictures are different.

Q2. Do we have to modify the VBA program if we use 3 other different pictures?

Summary

Two ways to construct a VBA program (or known as Macro)

1. Macro recording, the steps involved will be recorded as a VBA program.
2. Write the codes within Visual Basics Editor.

Three ways to run a VBA program (or known as Macro)

1. Select the intended VBA program from the Macro Menu and click RUN. (As in Task 2.)
2. Assign the intended VBA program to a button first, then click that button. (As in Tasks 3 and 4.)
3. In Visual Basics Editor, place the cursor within the intended VBA program code. Then click the Editor's play button.