# WRITING TO CELLS IN EXCEL FROM VBA

1. Cells(x,y): 表示第x行第y列
2. Range(‘ ’): 在某范围内
3. Range(‘ ’).Select + ActiveCell(. Value) 给range里的元素赋值。括号内可加可不加。
4. Range(‘ ’).Select + ActiveCell. Offset (x, y) : Offset 可以在指定的元素周围移动**x行往下y列往右**。
5. 字符串只要一个单引号在前：’\*\*\*\*

# DEFINING VARIABLES

1. 赋值 a = 1
2. 选定页即默认的输出页
3. 自动统一大小写（**建议：总是输出小写** ）

# READING DATA FROM EXCEL

1. Workbooks("\*\*\*.xlsm").Worksheets("sheet\*").Select: 操作可以指定文件和页。
2. **推荐**：每个子程序开头都given 特定的workbook and sheet。

# USING EXCEL WORKSHEET FUNCTIONS

* 1. 几种不同的方式引用函数（min，max，avg）：

AVG = WorksheetFunction.Average(num1, num2, num3)

Max = Application.WorksheetFunction.Max(num1, num2, num3)

Min = Application.Min(num1, num2, num3)

# SIMPLIFYING USING *WITH*

1. With + 函数包名称，引入函数包：子程序不用再加函数包名称

# REFERENCING A RANGE OF VALUES

1. ranges 的各种赋值方法

Range("a1") = 100

Range("a1") = 100

Range("c5:c10") = 200 ' range from c5 to c10

Range("b3", "b7") = 300 'range from b3 to b7

Range("d1:d10 a1:f1") = "Intersect" 'intersection of two sets

Range("e1,e3,e5,e7,e10") = "union" 'union of sets

Range(Cells(10, 10), Cells(15, 15)) = "square"

# COMMUNICATING WITH THE USER (Message Boxes: msgbox)

MsgBox "Welcome to the MSQF program! (1) "

X1 = MsgBox("Welcome to the MSQF program! (2) ", vbExclamation, "Fordham University")

X2 = MsgBox("Do you like New York City?", vbYesNo, "Fordham University")

MsgBox X2 ###输出6或7

MyNumber = Sqr(1790)

MyMessage = "The square root of 1790 is " & MyNumber & "."

Ans = MsgBox(MyMessage, vbInformation, "Square Root Machine") ###输出上面两句话

1. Displays a simple message.
2. **不同的title**：Displays same message but adds the heading ‘Fordham University’ and a decoration, a large **exclamation** point. Other decorations **are vbQuestion 问号, vbCritical 叉号, and vbInformation 感叹号.**
3. **不同的按键**：The default is to have a simple OK button on the message box. We can override the default to have a number of button combinations. The **vbYesNo** command places Yes and No buttons on the message box. **If the YES button is pressed, then X2 will be assigned the value of 6, and if NO is pressed, X2 is assigned the value of 7**. Other button combinations are**: vbOKCancel, vbAbortRetryIgnore, vbYesNoCancel, and vbRetryCancel.**
4. &..& 用来引用中间的命令，”…”　用来引用中间的文字。

# COMMUNICATING WITH THE USER (Input Boxes)

Sub myinputbox()

MyNumber = InputBox("Input any non-negative number.", "Square Root Machine", 0, 10000, 5000) ### **InputBox(*prompt***[, ***title***] [, ***default***] [, ***xpos***] [, ***ypos***] [, ***helpfile***, ***context***]**)**

MyAnswer = Sqr(MyNumber)

MyAnswer2 = Format(MyAnswer, "0.000") ##**#”0.000”表示小数的位数**。

MyMessage = "The square root of " & MyNumber & " is " & MyAnswer2 & "."

Answer = MsgBox(MyMessage, vbInformation, "Square Root Machine")

End Sub

# LOGICAL STATEMENTS

1. If 函数的使用

MyNumber = InputBox("Input any non-negative number.", "Square Root Machine", 0, 10000, 5000)

If MyNumber < 0 Then

MsgBox "The number entered is less than zero."

Exit Sub **###如果发生需要跳出循环**

End If

MyAnswer = Sqr(MyNumber)

MyAnswer2 = Format(MyAnswer, "0.000")

MyMessage = "The square root of " & MyNumber & " is " & MyAnswer2 & "."

Answer = MsgBox(MyMessage, vbInformation, "Square Root Machine")

1. If-else 的使用
   1. Rnd : 在（0，1）的随机数。
   2. ActiveWorkbook.Worksheets(1).Cells.ClearContents **###清理指定页**
   3. **CLEARCONTENTS deletes the values** typed into the cell **while DELETE removes the value plus, formatting, colors, etc**.

# LOGICAL STATEMENTS (SELECT CASE)

1. age = InputBox("Enter your age") **### Inputbox 需要(), 　msgbox可以直接”…”**
2. Case 0 To 16 **### 0 to 16 是包含0和16的．**
3. MsgBox msg **### 可以直接打印msg．正如　msgbox可以直接打印　“…”**

# CREATING LOOPS (FOR/NEXT)

1. 首先选中并清除表格内所有的contents
2. 格式for/next：

For i = 1 To 100

…

…

Next i

1. A = MsgBox("It took you " & i & " attempts." & vbCrLf & msg)――VBCRLF : 换行

# CREATING LOOPS (DO LOOP)

1. If X = "" Then Exit Sub ：用于无输入离开。
2. DO/LOOP 可以无限次重置输入，如果数据不在规定的范围内（If X >= 0 And X <= 10 Then Exit Do）。Data validation **: force the user to provide correct information.**

# CREATING LOOPS (DO UNTIL / LOOP UNTIL)

1. Do/until 可以让循环在指定的次数exit。

Do

…

MyCounter = MyCounter + 1

Loop Until MyCounter = 5

1. 如果if 内有子句，末尾需要end if。

If x >= 0 And x <= 10 Then

a = MsgBox("You entered the number " & x & ".")

Exit Do

End If

如果没有从句则直接exit

If x = "" Then Exit Sub

If x >= 0 And x <= 10 Then Exit Do

# USING ARRAYS

1. Dim MyArray(1 To 5) As Integer : 给一个字符串赋值个数和类型，index 1-5； DIM用来declare the array。
   1. Note：如果DIM MyArray(5) ，也是5 elements ，但index是0-4；在前面加上OPTION BASE 1 可以将初始index改成 1。
2. For/next 赋值字符串
3. 二维数组：Dim NewArray(1 To 5, 1 To 5)：赋值对应二重循环。

# ARRAYS WITH UNKNOWN DIMENSION

1. Dim myarray()：还未读取数据时array的size未知，所以括号留空
2. Redim array() ：重新定义array的size
3. CurrentRegion：等于 shift + control + arrow
4. WorksheetFunction.Sum(MyArray)：调用sum函数
5. With …：调用函数包
6. col\_num <> row\_num：大于或小于（不等于）
7. newrange.Value =: 将range内的值进行赋值操作。
8. .MMult(myrange, .MInverse(myrange))：矩阵乘法，原矩阵乘以逆矩阵。

NOTE: Matrix operation 能在array和 range 和object上应用。

# WRITING ARRAY INTO A RANGE

1. 用range按array赋值会比逐个元素赋值快很多。
2. 所有的类型（range，array）都在开头定义
3. VAL ：is used with the input boxes，但是输入的type是string。
4. Timer：first one is used to record the start time of the element by element approach. Second one is used again to record the stop time. Finally get the difference.
5. **Set** myrange = Range(Cells(1, 1), Cells(num1, num2))：SET函数设定一个range。
6. **Screenupdating ：** 是否关闭刷屏，False关闭（加快程序运行）；True打开（一般加在程序末尾）。

# FREEZING THE SCREEN (Screen updating)

1. 屏刷默认是开启的
2. 清全部数据:

For i = 1 To 3

Worksheets(i).Activate

Cells.Clear

Next i

# DECLARING VARIABLES

1. OPTION, EXPLICIT at the very top to do **variable declarations. 变量声明可以加快程序运行速度和减少memory分配。** Eg:

DIM MyVariable As String

DIM TF as Boolean

DIM int1 As Integer, int2 As Integer, int3 As Long

DIM int1, int2, int3 ‘all variables here are given the data type Variant by default

DIM MyWrkbk AS Workbook

# CALLING SUBROUTINES FROM SUBROUTINES

1. Call ：is to run sub routine。

## PUBLIC VS PRIVATE

1. SUB and PUBLIC SUB are the same: Defining a macro as public means that it is accessible by all modules and to the Excel user.
2. **A PRIVATE SUB** is one that is only accessible to other macros within the same module and is generally unavailable to the Excel user. **The private subroutine will not appear in the list of macros in Excel. 但如果删除private，程序依然能够被引用。**

# USER-DEFINED FUNCTIONS

1. Subroutine (Sub) : 由macros里的sub引用，并不一定返回结果。
2. Function: 有变量且总是会返回一个结果。functions are used by typing them into a particular cell. Function是直接type进excel的！！！
3. 结尾一定要有FunctionName = Result. Eg. SumOfSq = Sqr(ss)

# ARRAY FUNCTIONS

1. 输出array：SHFT+CTRL+ENTER。

# DEBUGGING CODE

* 1. 变量Typo：名字用大写加小写；在DIM中改变后，sub里的变量名会自动改变。
  2. Array的index：默认是从0-4（myarray(5)），可以改成1-5 （myarray(1 to 5)）
  3. VBA debugger 不一定是对的。
  4. 运用immediate window：其实就是print中间值（debug.print 变量名）
  5. 如果不知道bug的位置，使用 debug.pring 1, debug.print 2,… 在程序的不同位置。Eg. 如果在IW中看到1没看到2，说明1-2中有问题。
  6. F8: Step into 可以逐行运行程序，帮助debug。