

SOLUTIONS TO EXAM B

- 1) i) (8 points) Write down the command line for a combination of Excel built-in functions which produces the following function

$$f(x) = \begin{cases} \sqrt{3(x-1)} & \text{for } 1 \leq x \leq 4 \\ 3 & \text{for } x > 4 \\ \text{the value is complex} & \text{for } x < 1 \end{cases} \quad (1)$$

Use your function to compute $f(-45)$ and $f(5)$.

- ii) (8 points) Write a user defined function called $h(x)$ that produces exactly the same function of part i). Use for this two nested structures of the type

IIIF(condition, value for true, value for false).

Use your function to compute $h(-8)$ and $h(1.5)$.

- iii) (9 points) Write down the function (in a form similar to equation (1)) that is produced by the following combination of Excel built-in functions:

= IF($x \geq -5$, IF(OR($x \leq 3$, $x \geq 5$), SQRT($(x-3)*(x^2-25)$), "complex"), "complex").

Compute the values of the function for $x = -8.9$ and $x = 23$.

i)

= IF($x \geq 1$, IF($x \leq 4$, SQRT($3 * (x - 1)$), 3), "the value is complex").

$f(-45) = \text{the value is complex}, \quad f(5) = 3.$

ii) Function h(x)

h = IIF($x \geq 1$, IIF($x \leq 4$, Sqr($3 * (x - 1)$), 3), "the value is complex")

End Function

$h(-8) = \text{the value is complex}, \quad h(1.5) = 1.2247\dots$

iii)

$$f(x) = \begin{cases} \text{complex}, & \text{for } x < -5 \\ \sqrt{(x-3)(x^2-25)}, & \text{for } -5 \leq x \leq 3 \\ \text{complex}, & \text{for } 3 < x < 5 \\ \sqrt{(x-3)(x^2-25)}, & \text{for } x \geq 5 \end{cases}$$

$f(-8.9) = \text{complex}, \quad f(23) = 100.3992\dots$

2) (25 points) Enter the table below in the range A1:D4 of your Excel worksheet:

2	5	11	Monday
3	9	5	Tuesday
4	91	6	Thursday
5	43	80	Friday

Use the **IF THEN** syntax with **ELSEIF** together with the worksheet function **VLOOKUP** to write a user defined function with the following characteristics:

- i) It should be a function of one variable x . Declare the variable type as double and the outcome of the function as variant. Call your function $z(x)$.
- ii) The function should do the following:
 - If $2 \leq x < 3$ it should return two times the value located at B1.
 - If $3 \leq x < 4$ it should return 3 times the value located at B2 plus 2 times the value located at C2.
 - If $4 \leq x < 5$ it should return the value located at B3 times the value located at C3.
 - If $x \geq 5$ it should return the value located at D4.
 - If $x < 2$ it should return the message: “error message”
- iii) Compute $z(5)$, $z(0)$ and $z(3.4)$.

Function z(x As Double) As Variant

If $x < 2$ Then

z = “error message”

ElseIf $2 \leq x$ And $x < 3$ Then

z = 2* WorksheetFunction.VLookup(x, [a1:d4], 2)

ElseIf $3 \leq x$ And $x < 4$ Then

z = 3* WorksheetFunction.VLookup(x, [a1:d4], 2)+2* WorksheetFunction.VLookup(x, [a1:d4], 3)

ElseIf $4 \leq x$ And $x < 5$ Then

z = WorksheetFunction.VLookup(x, [a1:d4], 2)*WorksheetFunction.VLookup(x, [a1:d4], 3)

Else

z = WorksheetFunction.VLookup(x, [a1:d4], 4)

End If

End Function

$$z(5) = \text{Friday}, \quad z(0) = \text{error message}, \quad z(3.4) = 37.$$

3) i) (18 points) Use a **SELECT CASE** structure to produce a user defined function called **birthday**. The function should take a birth date as input and produce the following output:

- If the birth date does not fall into a weekend the function should return the value: “the birthday was between Monday and Friday”
- Otherwise it should return the value: “the birthday happened on the weekend”.
- In the program you should define all variable types, both for the input and for the output of your function.
- Obtain the value of the function for the input date 25/11/1945.

ii) (7 points) Draw a flow chart corresponding to your programme.

Function Birthday(x As Date) As String

Select Case Day(x)

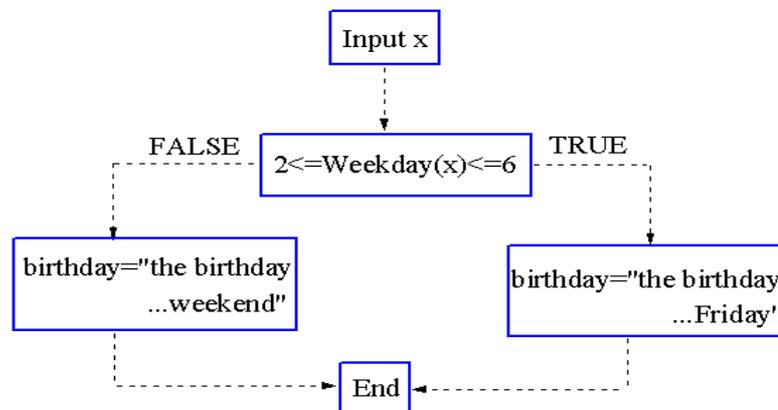
Case 2 To 6: Birthday = “the birthday was between Monday and Friday”

Case Else: Birthday = “the birthday happened on the weekend”

End Select

End Function

Birthday(25/11/1945) = the birthday happened on the weekend



- 4) Consider the table given below and suppose that you enter the data on this table into the range B1:E6 of your Excel worksheet:

Student's name	CW1	CW2	Exam
Ashraf	56	30	40
Shen	78	72	61
Li	9	63	67
Choi	34	70	45
Khetani	80	65	70

The first column of the table contains the names of various second year students doing a particular course. The second column contains the coursework marks obtained by each student for their first coursework. The third column contains the marks obtained by each student for their second coursework. Finally, the fourth column contains the mark obtained by each student in the final exam. The final mark that each student is going to obtain for the module is given by the following formula:

$$\text{Finalmark} = \frac{1}{100} (20 \times (\text{CW1} + \text{CW2}) + 60 \times \text{Exam}) \quad (2)$$

Write two user defined functions:

- i) (10 points) The first function should be called **finalmark** and given the name of a student in the list it would compute the final mark by means of the formula (2). Define all variable types and employ the worksheet function **VLOOKUP**.
- ii) (10 points) The second function should be called **class** and take again as an input the name of a certain student. The function **class** should make use of the function **finalmark** defined in i) and employ a **IF THEN** with **ELSEIF** structure. Depending on the name of the student, the function should return one of the following values:
 - If the value of **finalmark** for the student is lower than 40 it should return the message: “fail withdraw”
 - If the value of **finalmark** for the student is between 40 and 59 it should return the message: “average student”
 - If the value of **finalmark** for the student is between 60 and 79 it should return the message: “good student”
 - If the value of **finalmark** for the student is bigger than 79 it should return the message: “very good student”
- iii) (5 points) Compute finalmark(“Li”) and class(“Choi”).

Function finalmark(x As String) As Single

```
finalmark = ((WorksheetFunction.VLookup(x, [b1:e6], 2, False) + WorksheetFunction.VLookup(x, [b1:e6], 3, False)) * 20 + WorksheetFunction.VLookup(x, [b1:e6], 4, False) * 60) / 100
```

End Function

Function class(x As String) As String

```
If finalmark(x) < 40 Then
```

```
class = “fail withdraw”
```

```
ElseIf finalmark(x) < 60 Then
class = "average student"
ElseIf finalmark(x) < 80 Then
class = "good student"
Else
class = "very good student"
End If
End Function
finalmark("Li")=54.6, class("Choi")="average student"
```

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