

There is a small change in style of this years progress test:

- This years progress test has four questions. Three of them correspond to full marks.
- You have 90 min to answer the questions.

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► Examples, examples, examples:

1a) Compute the future value of an investment using the Excel built-in function FV. For an initial deposit of 2500 pounds in a savings account the bank pays an interest rate of 0.18%. For the next years you deposit 150 pounds at the beginning (end) of every month into the account. How much money is in the account after 5 years. Provide the exact command line for an Excel built-in function with all its arguments.

=FV(0.18%,60,-150,-2500,1) → £12,296.91      beginning

=FV(0.18%,60,-150,-2500,0) → £12,279.82      end

- do not forget the %-sign (or write 0.0018)

- even though you pay in you need to write -150 and -2500

- the 60 corresponds to 60 month from 5 years times 12 month

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**1b)** Write down the command line for an Excel built-in function which produces the function

$$f(x) = \begin{cases} \sin x - 1/8 & \text{for } x \leq 0 \\ x^3 - 7x & \text{for } x > 0 \end{cases}$$

Use your function to complete the table

	A	B	C	D	E	F
1	x	-12.24	-1.2	0	1.25	5.2
2	f(x)					

- The function can be produced with  
`=IF(x<=0, SIN(x)-1/8, x^3 -7 *x)`

- Just type into the cell B2 and then use the autofill function

	A	B	C
1	x	-12.24	-1.2
2	f(x)	=IF(B1<=0, SIN(B1)-1/8, B1^3 -7 *B1)	=IF(C1<=0, SIN(C1)-1/8, C1^3 -7 *C1)

	A	B	C	D	E	F
1	x	-12.24	-1.2	0	1.25	5.2
2	f(x)	0.19561	-1.05704	-0.125	-6.797	104.208

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**1c)** Write down the functions which are produced by the following combinations of Excel built-in functions

i) `=IF(x<=0, SIN(x)-1/8, x^3 -7 *x)`

ii) `=IF(Not(AND(x<>1, x<>-2)), "infinity", 1/(x-1)/(x+2))`

i) 
$$f(x) = \begin{cases} \sin x - 1/8 & \text{for } x \leq 0 \\ x^3 - 7x & \text{for } x > 0 \end{cases}$$

ii)

$$f(x) = \begin{cases} \frac{1}{(x-1)(x+2)} & \text{for } x \neq 1, -2 \\ \text{infinity} & \text{for } x = 1, -2 \end{cases}$$

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2) Write a user defined function with the name MinAv, which for an arbitrary number of input variables computes the minimum, the maximum, the average of the input and the sum of these three numbers. When the average plus 7 is smaller or equal than the sum, the function should return the sum and otherwise the average. Declare all your variables. Implement your function on an Excel spreadsheet to complete the following tables:

	A	B	C	D
1	x	y	z	MinAv
2	4	34	-11	
3	111	-5	12	
4	-1	-4	5	

	A	B	C	D	E
1	x	y	z	w	MinAv
2	4	34	-11	54	
3	34	-5	12	3	
4	-3	-4	5	2	

- As the number of input variables is arbitrary you have to call the function as MinAv(range) rather than MinAv(x,y,z)

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```
Function MinAv(range) As Single
    Dim MA, MI, AV, SU As Integer
    MA = WorksheetFunction.Max(range)
    MI = WorksheetFunction.Min(range)
    AV = WorksheetFunction.Average(range)
    SU = MA + MI + AV
    If AV + 7 <= SU Then
        MinAv = SU
    Else
        MinAv = AV
    End If
End Function
```

	A	B	C	D	E
1	x	y	z	w	MinAv
2	4	34	-11	54	63
3	34	-5	12	3	40
4	-3	-4	5	2	0

- Row 2: MI=-11, MA=34, AV=9, SU=32  
 - Row 3: MI=-5, MA=111, AV=39, SU=145  
 - Row 4: MI=-4, MA=5, AV=0, SU=1

	A	B	C	D
1	x	y	z	MinAv
2	4	34	-11	32
3	111	-5	12	145
4	-1	-4	5	0

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3) Write a user defined function with the name MinMax, which for an arbitrary number of input variables computes the minimum and the maximum. When the minimum is negative the function should return the minimum plus 10 and otherwise the maximum. Declare all your variables. Implement your function on an Excel spreadsheet to complete the following tables:

	A	B	C	D
1	x	y	z	MinMax
2	3	-5	2	
3	2	7	44	
4	0	4	66	

- You can compute this table easily not even writing the function

	A	B	C	D
1	x	y	z	MinMax
2	3	-5	2	5
3	2	7	44	44
4	0	4	66	66

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Function MinMax(range) As Integer

Dim x, y as Integer

x = WorksheetFunction.Max(range)

y = WorksheetFunction.Min(range)

If y < 0 Then

MinMax = y + 10

Else

MinMax = x

End If

End Function

4) For the table below complete the command line and the output. Then write a function which uses the select case structure and choses for a country by means of an HLOOKUP table the capital, the number of inhabitants, the area or the birthrate depending on whether the second input parameter is "Capital", "Inhabitants", "Area" or "Birth rate". Declare all variables!

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	A	B	C	D	E	F
1	Country	UK	Germany	India	China	Brasil
2	Capital	London	Berlin	New Delhi	Beijing	Brasilia
3	Inhabitants	60.3 Mio	82.4 Mio	1065 Mio	1298 Mio	184 Mio
4	Area/km <sup>2</sup>	244820	357021	3287590	9595960	8511965
5	Birth rate	10.88	8.45	22.8	12.98	17.25
6						

=HLOOKUP("UK",A1:F5, \*,FALSE) → 60.3 Mio      \* = 3  
 =HLOOKUP("New Delhi", \*,4,FALSE) → 22.8      \* = A2:F5  
 =HLOOKUP("Great Britain", A1:F6,2) → \*      \* = Brasilia  
 =HLOOKUP("Great Britain", A1:F6,2,False) → \*      \* = #N/A  
 =HLOOKUP("1298 Mio", \*) → 12.98      \* = E3:F5,3  
 =VLOOKUP("Capital", A1:F5,3,FALSE) → \*      \* = Berlin  
 =VLOOKUP(357021, \*) → 9595960      \* = C1:F5,3  
 =HLOOKUP(5000000, A4:F5,2)→ \*      \* = 22.8  
 =HLOOKUP(\*, A1:F5,3,FALSE) → 1065 Mio      \* = "India"  
 =HLOOKUP("London", A2:F6,\*,FALSE)→ 10.88      \* = 4

Function Cof(Co As String, command As String) As Variant

Select Case command

Case "Capital": Cof = WorksheetFunction.HLookup(Co, [A1:F5], 2, False)

Case "Inhabitants": Cof = WorksheetFunction.HLookup(Co, [A1:F5], 3, False)

Case "Area": Cof = WorksheetFunction.HLookup(Co, [A1:F5], 4, False)

Case "Birth Rate": Cof = WorksheetFunction.HLookup(Co, [A1:F5], 5, False)

Case Else: Cof = "Command not found"

End Select

End Function

**Good luck with the progress test!**