
CITY UNIVERSITY LONDON

Programming Excel VBA Test

Group B

This is an open book exam. You may use your lecture notes as well as task- and solution-sheets from lab-sessions. No books will be allowed into the exam.

Write your answers to all questions in the answer booklet provided.

Full marks may be obtained for correct answers to all four questions. Each questions carries 25 marks.

To avoid possible accusations of cheating close all applications except Microsoft Excel and the Visual Basic Applications editor before starting this exam.

Students may use the Excel or VBA help functions but should not use any online help option.

Time: You have 90 mins to complete this test.

Turn over ...

1) Verify the following identity:

$$\sum_{k=0}^{n+1} \sum_{p=0}^k \cos(2p) = 1 + \frac{n}{2} + \frac{\sin(n+2)^2}{2 \sin(1)^2}. \quad (0.1)$$

- Write, for a given value of n , a VBA code for a user defined function to evaluate the left hand side of equation (0.1). The code should use two nested DO ... LOOP structures with the WHILE command (**12 points**).
 - Write a user defined function depending on n , which reproduces the right hand side of this equation (**8 points**).
 - Obtain the values of both functions for $n = 4$ and $n = 9$ (**5 points**).
- 2) Write the code for a subroutine called **anticommute** which given two 2 by 2 matrices A and B , computes their anticommutator, that is a matrix C defined as

$$C = A \cdot B + B \cdot A$$

The program should have the following structure:

- It should read the matrices A and B from cells A1:B2 and A3:B4, respectively.
- It should use two nested DO ... LOOP with UNTIL structures for the computation of the anticommutator.
- When run, it should write “the anticommutator is:” in cell E1 and the resulting matrix C in cells F1 : G2

(20 points)

Use the program to compute the anticommutator of the matrices

$$A = \begin{pmatrix} 3 & -7 \\ 1 & -5 \end{pmatrix} \quad \text{and} \quad B = \begin{pmatrix} 2 & -2 \\ -1 & 6 \end{pmatrix}$$

(5 points)

Turn over ...

3) Consider the following set of data

x-values:	1	2	3	4	5	6	7	8	9	10
y-values:	0.1	1	10	30	50	80	120	160	200	240

- Assuming that the points are linearly correlated, meaning that ideally they all lie on the line $y = \alpha x + \beta$, use the Excel built-in functions Slope and Intercept to determine α and β (**7 points**).
 - Use the Excel built-in functions Linest to determine the square of the regression coefficient (**8 points**).
 - Add a trendline into an “Scatter”-type plot. Choose first a polynomial trend and fit your data to a polynomial of degree three. Then choose a power trend for your fit. Give the equations of both fits and the corresponding values of r^2 in each case. In light of your results, which fit is best? (**10 points**)
- 4) Write a VBA code for a subroutine named **tutorial** which would explain the various kinds of icons that can be displayed by a message box. The structure of the program should be as described below:

- When run your program should start by opening an input box with title “Icons tutorial” and prompt “Enter here one of the following numbers: 16, 32, 48 or 64”
- If the number entered in the input box is 16, a message box with an OK button only and a Critical Message Icon should open. It should have the same title as above and prompt “Critical Message Icon”.
- If the number entered in the input box is 32, a message box with an OK button only and a Warning Query Icon should open. It should have the same title as above and prompt “Warning Query Icon”.
- If the number entered in the input box is 48, a message box with an OK button only and a Warning Message Icon should open. It should have the same title as above and prompt “Warning Message Icon”.
- If the number entered in the input box is 64, a message box with an OK button only and an Information Message Icon should open. It should have the same title as above and prompt “Information Message Icon”.
- If you enter any other number or text the program should go back to the beginning (that is, the input box will open again).
- Use variables to assign the text to the Title and Prompt parameters in message boxes and the input box, such that for instance you only have to type “Icons tutorial” once in your program. Declare all your variables.

(25 points)

Internal examiner: Dr. Olalla Castro-Alvaredo