
CITY UNIVERSITY LONDON

Programming Excel VBA Test

Group A

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:

$$\sum_{k=0}^{n-1} \sum_{p=0}^k \sin(2p) = \frac{n \sin(2) - \sin(2n)}{4 \sin(1)^2} . \quad (0.1)$$

- 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 UNTIL 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 $n = 5$ and $n = 8$ (**5 points**).
- 2) Write the code for a subroutine called **commute** which given two 2 by 2 matrices A and B , computes their commutator, 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 WHILE structures for the computation of the commutator.
- When run, it should write “the commutator is:” in cell D1 and the resulting matrix C in cells E1 : F2

(20 points)

Use the program to compute the commutator of the matrices

$$A = \begin{pmatrix} 2 & 1 \\ 0 & -1 \end{pmatrix} \quad \text{and} \quad B = \begin{pmatrix} -2 & 5 \\ 1 & 7 \end{pmatrix}$$

(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:	-1	-2.5	-3	-4.5	-5	-6	-7.5	-8.5	-9	-10.5

- 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. Assume for this that the trend is of polynomial type. Fit your data first to a polynomial of degree two and then to a polynomial of degree five. Give the equations of such polynomials 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 **icon** 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 “Classifying icons” and prompt “Enter here an integer number:”
- 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 “This is a 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 “This is a 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 “This is a 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 “This is an 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 “Classifying icons” once in your program. Declare all your variables.

(**25 points**)

Internal examiner: Dr. Olalla Castro-Alvaredo