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# CITY UNIVERSITY LONDON

## Excel VBA Practical Test

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January 2010

Group A

This is an open book exam. You may use your lecture notes as well as task- and solution-sheets from previous lab-sessions.

Please notice that all the material must be brought to the exam in printed form. No internet access, books or USB keys are allowed into the exam.

Write your answers in the 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 other applications except Excel before starting this exam.

Time:        You have 90 mins to complete this test.

Turn over...

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

$$f(x) = \begin{cases} |x| & \text{for } x \geq 6 \\ x! & \text{for } x = 3 \text{ or } x = 5 \\ e^x & \text{otherwise} \end{cases}$$

Use your function to compute the numerical values of  $f(-2)$  and  $f(4)$ .

**(12 points)**

- ii) Consider the following two combinations of Excel built-in functions:

$$\begin{aligned} g(x) &= \text{IF}(x \leq 2, \text{IF}(x = 0, x, x^2), x^3) \\ h(x) &= \text{IF}(x < 2, \text{IF}(\text{OR}(x < 0, x > 1), 1, 0), x) \end{aligned}$$

For each of these two functions determine:

- (a) For which value or values of  $x$  does the function return the value zero?
- (b) For which value or values of  $x$  does the function return a value greater than zero?
- (c) For which value or values of  $x$  does the function return a value less than zero?

**(13 points)**

- 2) The following table gives a detailed break-up of  $CO_2$  emissions per sector for the London boroughs of Islington and Kensington, as provided by a governmental web-site. Here we have just selected the data for the years 2005 and 2006. The data for emissions are expressed in thousands of tons (kT).

	A	B	C	D	E	F
1		<b>Year</b>	<b>Industry</b>	<b>Domestic</b>	<b>Transport</b>	<b>Population</b>
2	<b>Islington</b>	<b>2005</b>	<b>608,63</b>	<b>391,67</b>	<b>146,08</b>	<b>184200</b>
3		<b>2006</b>	<b>656,17</b>	<b>390,16</b>	<b>144,23</b>	<b>185000</b>
4	<b>Kensington</b>	<b>2005</b>	<b>763,91</b>	<b>401,81</b>	<b>179,88</b>	<b>175800</b>
5		<b>2006</b>	<b>803,91</b>	<b>403,03</b>	<b>178,29</b>	<b>178000</b>

The aim of this exercise is to write down a user defined function called **EPC** which computes the amount of emissions per capita by using the following formula:

$$\text{EPC} = \frac{(\text{Total emissions from all sectors in kT}) \times 1000}{\text{population}}$$

The function should be constructed as follows:

- (a) It should take the name of the borough and the year as input and return the emissions per capita as output.
- (b) It should employ one **SELECT CASE** structure (for the borough) and a combination of **VLOOKUP** functions, where the lookup value is the year, in order to extract the relevant data from the table.
- (c) Design your function so that if a borough's name is entered which is not in the table, the function returns "this borough is not on the list".
- (d) The data type of the input and output of the function should be defined.

Write down the code for the function **EPC** and by using it, report the emissions per capita for the borough of Islington in 2006.

**(25 points)**

Turn over...

- 3) In order to keep students and colleagues informed about his availability hours, a lecturer wants to design a user defined function called **AVAIL**, which taking a date as input, returns one of the following messages as output:
- (a) If the date falls on the summer months (June, July or August), then the function should return the message: “Not available”
  - (b) If the date falls on any other months, then the function should return one of the following messages:
    - (b.1) If the date falls on a Monday, a Tuesday or a Friday, then the function should return the message: “Available between 12:00 and 15:00”.
    - (b.2) If the date falls on a Wednesday or a Thursday, then the function should return the value: “Available between 15:00 and 17:00”.
    - (b.3) If the date falls on a weekend, then the function should return the value: “Not available on weekends”.

Write down the code for the user defined function **AVAIL** and test it by computing its value for the date 22/12/1986.

The code must employ two (nested) **IF...ELSEIF** structures. The variable type of the input and output must be defined.

**(25 points)**

- 4) The following table shows the final grades obtained by four (fictitious) students in the four modules they took this year. The number of credits for each module is given in the last row of the table.

	A	B	C	D	E
1	<b>MODULE NAME</b>	<b>F1</b>	<b>F2</b>	<b>F3</b>	<b>F4</b>
2	Smith	56,7	64,3	45,1	69,3
3	Patel	86,2	67,0	75,8	61,7
4	Hussain	45,0	50,0	45,6	52,1
5	Solanki	76,0	74,7	76,2	81,1
6	<b>MODULE CREDITS</b>	<b>30</b>	<b>25</b>	<b>15</b>	<b>40</b>

Write down the code of a user defined function that, taking the student's name as input, computes the year weighted average for the student, according to the formula

$$\text{weighted average} = \frac{\text{sum of grade times number of credits for each module}}{\text{total number of credits}}$$

Call your function **WEAVE** and define the data type of input and output. Design your function in such a way that if the input is not a student's name on the table, the function returns the message: “not on record”.

Employ a combination of **VLOOKUP** functions, with lookup value given by the student's name, to extract the values of the grades from the table. Use **HLOOKUP** functions with lookup value “name of the module” in order to extract the number of credits of a given module from the table.

Report the value of the function for Solanki.

**(25 points)**