

Business Mathematics (BK/IBA) – Quantitative Research Methods I (EBE)

Digital test 1 (sample)

Question 1

- Open the file “1234567_digitaltest_1_sample.docx” on the desktop.
- Type your name, student number, programme (BK/IBA/EBE), etc. at the appropriate places. **(1 point)**
- Save the document on the desktop under the filename in which “1234567” is replaced by your student number (=7 digits, not your VU-net ID!). Thus, the new filename becomes something like “8520981_digitaltest_1_sample.docx”.
- Leave the document open for inserting the answers to questions 2 and 3 in the indicated places. We recommend you to save your document regularly while doing the next questions.

Question 2

- Retype the following formula in a professionally typeset way into the document. You don't need to choose a font similar to the original one, but you should at least use the usual conventions for typing mathematical text, and type the mathematical part exactly as given (for instance, don't replace $\frac{1}{n}$ by $1/n$). **(1 point)**

$$NPV(i, N) = \sum_{t=0}^N \left(\frac{R_t}{(1+i)^t} \right)$$

- Idem. **(1 point)**

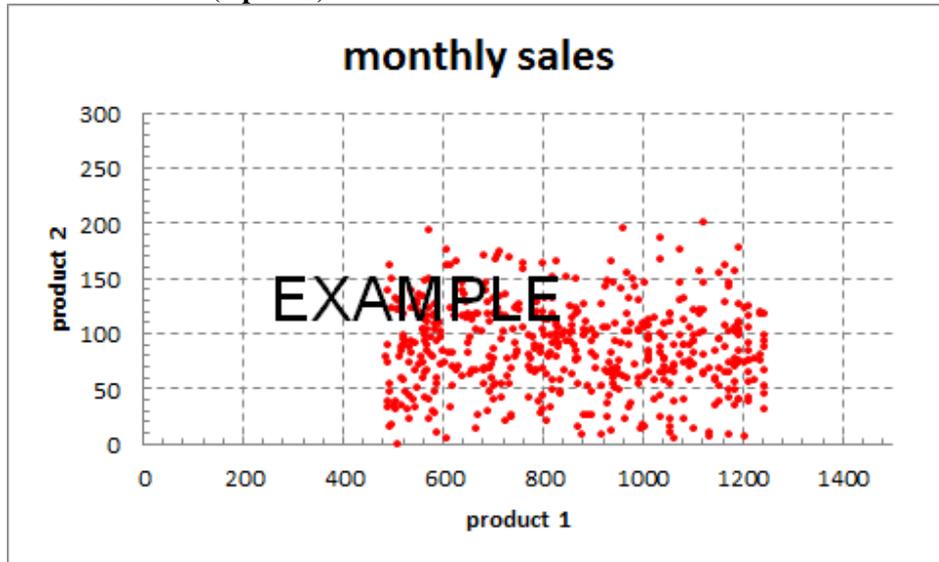
$$\text{if } \phi \in \mathbb{R} \text{ then } |\sin \phi| \leq 1$$

Question 3

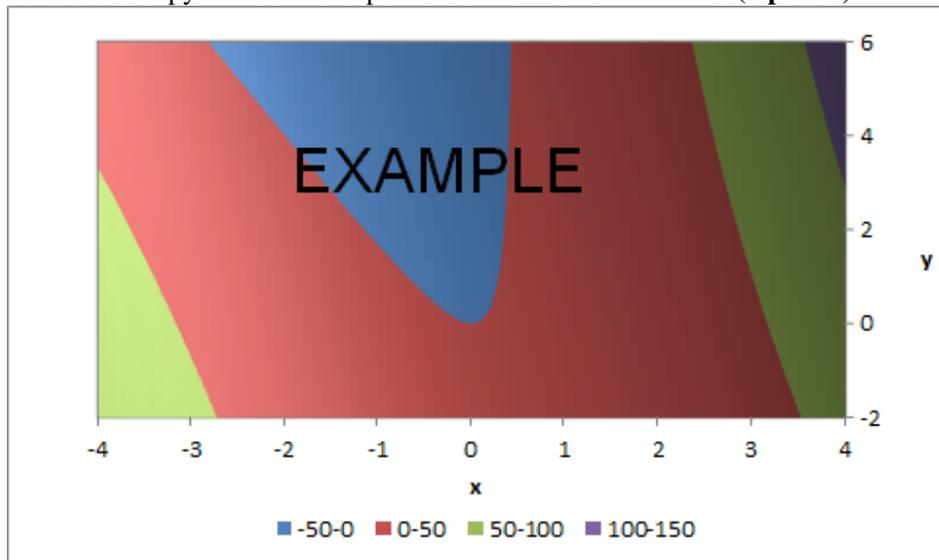
- Open the file “excel_digitaltest_1_sample.xlsx” that resides on the desktop. You will see two columns of data. Column A represents monthly sales of product 1 (in thousands of euro) for 510 different shops. The second column represents monthly sales of product 2 (in thousands of euro) for the same shops. Below, we will indicate the vector of sales of product 1 as \mathbf{x} , and that of product 2 as \mathbf{y} . You don't need to report anything. You don't need to hand in your Excel file, but it can be convenient to save it regularly.
- Create a new column (C) that represents a new variable derived from the other two, according to: $z_i = \sqrt{x_i} - 2y_i$. Do not use cell names for this question, but cell references only. Report the Excel formula used¹ by typing or pasting it in the Word file. **(1 point)**
- As you may observe, some sales in column B are negative. Probably these shops had a bad accountant. Make another new column (D) such that the sales of product 2 are shown when the number in column B is larger than 10, and “CHECK!” is shown when this number is 10 or smaller. Do not use cell names for this question, but cell references only. Report the Excel formula used¹. **(1 point)**

¹ Excel formulas should be reported in plain Excel syntax, e.g., “=SQR(A1)”.

- d) Type a formula that counts how many cells in column B contain a number that is 10 or smaller. Do not use cell names for this question, but cell references only. Report the Excel formula used¹. **(1 point)**
- e) Make a scatterplot of the data in columns A and B as shown below. Try to reproduce the graph below as precisely as possible², leaving out the text “EXAMPLE”. Copy the result and paste it to the Word document³. **(2 points)**



- f) Given is the function $f(x, y) = 5x^2 - y + 2yx$. We wish to make a 3D-plot of this function, with a domain for x : $[-4, 4]$ and for y : $[-2, 6]$. To make a smooth graph, we have taken a step size of $\Delta x = \Delta y = 0.1$. Try to reproduce the graph below as precisely as possible, leaving out the text “EXAMPLE”. Copy the result and paste it to the Word document³. **(2 points)**



² For those who are colour-blind: the dots are in red, the rest is black or grey.

³ Keep in mind the possible dangers of just pasting. We recommend to paste “as picture”.