

**TEST- EMPA
(DEGREE IN ECONOMICS)
TERM 14/15
7.10.2015**

- 1.- Indicate "Test-EMPA 2.10.17" in each page.
- 2.- ERASE anything in the recycle Bin and in D:/ directory or in My Documents related to GAMS or EMPA.
- 3.- Do not indicate the name in any of the sheets delivered.
- 4.- Do not sign the sheets delivered.
- 5.- Relative importance of the questions: see % in each question.
- 6.- Do not show your answers when asking questions about the test.
- 7.- Sign the assistance sheet.
- 8.- You cannot pass the test if you fail two of the questions or if you leave a question unanswered.
- 9.- You are only authorized to use the GAMS program (including manuals and libraries), the virtual campus and Google translate.
- 10.- Please put FIRST your ID and then the name of the question as the name of the file. Do not upload any files not mentioned in your answers or any unnecessary files (*.lst, *.gpr, *.log etc). Do not upload zip files.
- 11.- Grades: 16th October 2017 (20:00)
- 12.- Revision of test results: tutorials time during the first two weeks after the grades are published.
- 13.- Duration 120 minutes

QUESTION N. 1: (TOPIC 1: MCP) (50%)

Suppose a household consumes two goods, X1 and X2. The prices of these goods are p1 (4€) and p2 (6€). The utility function of the household is a Cobb Douglas function of the form:

$$u(x_1, x_2) = x_1^{(\alpha_1)} x_2^{(\alpha_2)}$$

being α_1 and α_2 equal to 0.2 and 0.8 respectively. Assuming the level of utility we want to obtain is equal to 65.75007 units, and the that the consumer wants to minimize expenditure:

- a) Derive the KKT conditions for an optimal solution of this problem.
- b) Prepare a GAMS program that solves these KKT conditions as a MCP. (DNI_Q1_b.gms)
- c) Explain clearly the meaning of each variable and constraint and the existing complementarity conditions both in general terms and using the results obtained for the equations and the variables of the problem (LO, UP, L, Marginals).
- d) The consumer has been advised by the doctor to consume at least 40 units of good 1, rewrite the program explicitly including the new constraint. (DNI_Q1_d.gms). Comment the results.

VERY IMPORTANT: GIVE INITIAL VALUES TO THE VARIABLES BEFORE SOLVING THE MODEL.

QUESTION N. 2 (TOPIC 2: MARKET EQUILIBRIUM AND MCP) (25%)

Using the file “Question2.gms” answer the following questions:

- a) Prepare a loop in which you simulate using different costs for technology a (2, 4, 6, 8). Prepare also a report where you represent the production of the different activities, the producer and consumer surpluses, the equilibrium price and quantities, and the different costs used for technology “a” in each iteration. Comment the results.

QUESTION N. 3 (TOPIC 3: APPLICATIONS) (25%)

Using the file “Question3.gms”:

- a) Explain why there are activities with zero production in Case 2.
- b) Explain why there are always nonnegative prices for goods.
- c) Explain why there are resources with an opportunity cost of zero in case 1.