Quantitative tools Level 1 -Exam
Décembre 2015 - 3 hours

All calculators allowed; computers with an autonomous power supply allowed.
Students must do the exam in the language (French or English) of the class they attended.
In case of any difficulties understanding the French version of the exam, non-French speaking students are allowed to have a look at the English version.

1. **(3 points)** A datum experiences a 20% increase over the first year and a 20% decrease over the second year.
   a) What's the global variation over the 2-year period ?
   b) What's the average annual variation increase rate?
   c) What should be the decrease rate over the second year so that the datum is back to its initial value?

2. **(2 point)** A country experiences an inflation rate between year 1 and year 2 of 10%. Over the same period, the GDP increased from 2 000 to 2 400 (current money units).
   a) What was the GDP growth rate in value (nominal growth rate)?
   b) What was the GDP growth rate in volume (real growth rate)?

3. **(2 point)** In a country, 50% of the households don't pay any income tax, whereas 20% of the households pay 50% of the total income tax perceived by the State.
   a) What's the Gini-Lorenz curve like?
   b) Calculate the Gini-coefficient.

4. **(1 point)** The VAT on a tax-included price is lowered from 25% to 15%. What's the global price variation experienced by the final consumers?

5. **(5points)** Let's consider the following salary distribution in a company:

Salaries (€)	nber of people
from 10000 to less than 20000	200
from 20000 to less than 30000	800
from 30000 to less than 50000	180
from 50000 o less than 90000	20

Determine the following values and explain what they mean:
   a)   The mean salary.
   b)   The median salary.
   c)   The modal salary
   d)   The standard deviation.
   e)   The inter-decile ratio D9/D1.

6. **(2 point)** A company exports 3 types of products, A, B and C ; here are the prices (P) and the quantities (Q) sold on 2 differents dates :

	Salary (€)		Employées	
	P	Q	P	Q
A	10	10	15	12
B	30	20	26	16
C	100	3	150	5

a)   Calculate the Laspeyres price index of the exports
   b)   Calculate the Paasche price index of the exports

7.   **(2 point)** Here are the consumptions and disposable incomes of a population over 10
     years (in appropriate units) :

Year	Disposable income	Consumption
1	2.440	2.250
2	2.740	2.490
3	2.900	2.708
4	2.900	2.640
5	2.990	2.679
6	3.350	2.930
7	3.650	3.230
8	3.960	3.411
9	4.570	3.890
10	4.880	4.230

   a) Calculate (use the result of Excel spreadsheet) the linear model that gives the consumption
       as a function of the disposable income.
   b) Based on the coefficient of linear correlation, how much of the variance is explained by
       this model? (use the result of Excel spreadsheet)

7(2 points) A sum of 5 000 € is invested at an annual rate of 3 % for 4 years.
   a) What has that sum become after 4 years ?
   b) What sum should have been invested in the first place, with a 4% interest rate, in order to get
       the same amount in year 4 as the one of question a) ?

8(1 point) An employee says to his boss « You earn +100 % more than I do ». The boss answers
"Your salary is only x % less than mine".
       What is x ?