Quantitative Tools - Level I **March 9, 2017**
Time Limit: 60 Minutes

First Midterm - Spring 2017

Instructions

- The use of a mobile phone, or any other means of communication, is forbidden.
- Give all the results with **a two decimals** precision.
- Write answers on a **separate** sheet of paper. **Underline** your results.

Section are independent and can be treated separately.

1 Of taxes (1 point)

The VAT rate is 20%. VAT rate is said to be *outside* when VAT taxes are computed on the price without tax. VAT is said to be *within* when VAT taxes are computed on the price with tax.

1. VAT is **outside.** An apple is sold 2€ VAT included. What is the price without tax ?
2. VAT is **outside.** An orange is sold 1€ without tax. What is the price with tax ?
3. VAT is **within.** An apple is sold 2€ VAT included. What is the price without tax ?
4. VAT is **within.** An orange is sold 1€ without tax. What is the price with tax ?

2 FX markets on the Red Square (3 points)

Sasha, a Russian student studying in Berlin, wants to buy a new computer. The price in Berlin is 1099€ and 76990 Rub in Moscow.

1. Given that the nominal exchange rate is 1 Russian Ruble equals 0.016€, where should Sasha buy his new computer ?
2. What should be the nominal exchange rate so that Sasha is indifferent between buying the computer in Germany or in Russia ?
3. Price increases by 10% in Russia and by 2% in Germany. What should be the new nominal exchange rate so that Sasha remains indifferent between buying the computer in Germany or in Russia.

3 La remontada (4 points)

John's income decreased by 10% the first year, decreased by 5% the second year and increased by 15% the third year.

1. What is the global variation of John's income over the 3-years period ?
2. What is John's income average annual variation rate ?
3. By how much shoud John's income increase the third year so that it is back to its initial value?
4. The annual inflation rate was 5% during the three years. What is the global variation of John's purchasing power over the 3-years period ?

4 A perfect day for Bananafish (5 points)

Table 1: Prices of different fruits in different years (€/kg)

	Orange	Apples	Kiwi fruit
2014	0.91	0.43	1.66
2015	0.91	0.46	1.90
2016	0.95	0.51	2.10

Table 2: Quantities purchased of fruits (kg)

	Orange	Apples	Kiwi fruit
2014	100	78	4
2015	98	86	15
2016	96	88	16

1. Calculate an Orange Price Index for 2014 to 2016 with 2015 as the base year.
2. Calculate the Laspeyres index for 2014 to 2016 with 2015 as the base year.
3. Calculate the Paasche index for 2014 to 2016 with 2015 as the base year.

5 The Factory (7 points)

Franny and Zooey work in a call-center in Le Havre. They are paid the minimal wage 9.76€/hour. They work 35 hours a week, four weeks a month.

1. What is their monthly salary ?
2. **Two years later**, in 2016, Franny is now earning 10% more than her initial wage, while Zooey is earning 15% more than his initial monthy wage. How lower is Franny wage compared to Zooey's (state the answer in % of Zooey's wage) ?

3. By how much should Franny's wage increase to catch up Zooey's wage ?

The monthly tax rate is progressive and as follow :

Income ranges			
0 - 1000	1000 - 1200	1200 - 1500	Above 1500
0%	5%	15 %	20 %

Table 3: Income tax rates

4. What is the amount of taxes paid by Franny in 2016 ? By Zooey ?
5. What should be the flat tax-rate so that Franny pays the same amount of taxes ?

The distribution of monthly wages inside the cookie factory is the following :

Wages	Frequencies
1200 - 1400	9
1400 - 1600	8
1600 - 1800	2
1800 - 2000	1

Table 4: Distribution of the wages in the cookie factory

6. What is the mode of the wage distribution ?
7. State Zooey and Franny wages (in 2016) in terms of the median worker's wages (ie Franny earns XXX% of the median worker wages).

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