

**Quantitative Tools - level I**  
**Fall 2015**  
**Introduction, Changes and Percentages**

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**Exercise 1 - Variables (\*)**

1. Indicate if the following variables are qualitative or quantitative. Discrete or continuous, ordinal or nominal ?
  - The income of inhabitants of Alaska
  - Eye's colour in a random Sciences Po International Relations class
  - GRE (Graduate Record Examinations) Grades
  - Classes in HMS Titanic
  - The gender of students in a Quantitative Tools level 1 class
  - The results of a customer satisfaction survey
  - The number of Coca Cola cans in Sciences Po vending machines
  - The number of goals in each Barcelona vs. Real Madrid football match since 2000
  - The jobs of people in a random commuter train.
  - The number of phone calls received by each Sciences Po secretary, a few hours after the online course registration has begun.

**Exercise 2 - Relative change and percentages (\*)**

Alice is working as a junior consultant at Wonder Consulting Group, a Wonderworld-based consulting firm. Her annual income is \$35'000. After a raise, her annual income becomes \$40'000.

1. What is the absolute change of Alice's income ? The relative change (give it stated in percentages) ?
2. Alice's pay increase is divided as follows : 70% of it is a bonus for outstanding performance and the rest is annual automatic increase. Can you find Alice's bonus in dollars ?
3. The following year, Alice has no bonus. At Wonder Consulting Group, the annual automatic pay increase is, in percentages, the same each year. Can you find the income of Alice after the annual automatic pay increase ?
4. In the third year, a economic slowdown occurred in the Wonderworld. As a consequence Alice's income decreased by 15% and the annual automatic raise is removed. What is now Alice's income ?

- The fourth year, the economic environment improved and Alice wants to negotiate a raise of her income. What raise should Alice ask so that she would earn the same income as she was before the slowdown ?

### Exercise 3 - Relative change and percentages (\*\*)

Bob is doing some shopping during the sales. He has \$100 in his billfold. Help Bob doing the good choices !

- Bob has found two terrific sweaters he really loves. The first one has a initial price of \$60, but it has a fairly 30% discount. The second one has a initial price of \$50 and a 10% discount. Which one is cheaper ?
- Bob finally changes his mind and looks forward low-rise jeans. One jeans costs \$150 but it has a first 20% discount and a further discount of 10%. Can Bob afford this low-rise jeans (please also give the final price of the jeans)?
- Bob gives \$80 for a low-rise jeans with a 30% discount. What was the initial price of the jeans ?
- Bob also buys a very cool t-shirt for \$20 which had a 20% discount. How much (in \$) has Bob saved thanks to the sales ?

### Exercise 4 - Average growth rate (\*\*\*)

Santiago and Manolin are two fishermen who go fishing every day. Here is the table of their catch :

Days	Nb of fishes
Monday	5
Tuesday	6
Wednesday	4
Thursday	7
Friday	9
Saturday	8

Table 1: Results of Santiago and Manolin's catch

- Give for each day (except Monday) the absolute change and the relative change of their catch (stated in percentages)(you should compare each day with the following)
- What is the aggregate change from Monday to Saturday ?
- What is the average growth rate between Wednesday and Friday ?
- What is the average growth rate for the whole week ?