Quantitative Tools - level I
Fall 2015
Exercises 4 - Core Vales & Dispersion & OLS

1 Core Values

Find the mean, median, standard deviation and absolute deviation of the following sets :

1. $X = \{1, 2, 3, 5, 8, 10, 13, 12, 15\}$
2. $X = \{1, 4, 5, 8, 9, 12, 18, 22\}$

2 Clementine Wages

Clementine, an emerging tech company, has the following wages' distribution :

Wages	Frequencies
100-200	2
200-300	2
300-400	5
400-500	7
500-600	9
600-700	9
700-800	8
800-900	6
900-1000	2

Table 1: Wages in Clementine

1. What are the mode, the median bin, and the average wage in Clementine ?
2. What are the first decile (D1) and last decile (D9) of the wage distribution in Clementine?
3. What is the medial ?

After some month of difficulties, Clementine's CEO has written the following email to all Clementine's employees :

From: Clementine' CEO
To : All Employee
Date: November 7, 2015
Subject: A more focused Clementine

Team,

We cutting our staff so we can spend the money butter. Emails like this are usually riddled with corporate speak so I'm going to give it to you straight.

The team has been working around the clock to simplify our plans for Clementine. The roadmap is also to change how we work and what we need to do that work. Product and Engineering are going to bear the brunt. We've got too many engineers and once we've cut that group, we 'll have too many of everybody else.

So we made an extremely tough decision: we plan to fire up to 25 people across the company. But it's not their fault; we hired them when we shouldn't have. Clementine will give them decent severance and help finding a new job. We also decided to reduce the wages of every left employee by 10\%.

Thank you all for your trust and understanding here. This isn't easy. But it is right.

Bill

As a results, the wage distribution is cut at \$600, only the upper part is left and wages of left employees are reduced.

1. What is the new average wage ?
2. What is the ratio D9/D1 ? Does the wage distribution of Clementine seems to you more equal than before the redundancies ?
3. What is the Gini coefficient in Clementine ?

3 Alice's saving booklet

Alice had saved \$10,000 on a bank account for ten years. The annual interest rates varied depending on the S&P 500 index. For the first four years, she enjoyed a 6% interest rate. The three following years, she got 7% interest rate. The last three years, the interest rate was about 8%.

1. What is the average annual interest rate ?

4 Alice and Bob in Sciences Po

Alice and Bob are two young Sciences Po students. After the midterm, Alice and Bob are comparing their results

	Alice	Bob
International Economics	9	16
History of Globalization	15	13
Game Theory	14	14
Environmental Economics	10	13
German	17	9

Table 2: Alice and Bob midterm results

1. Who has the better mean ?
2. Who is the most regular ?

5 Law school vs. Business School

After year after graduating, students from Law and Business School have the following wages distribution.

Wages	Law School	Business School
20000 - 30000	6	30
30000 - 40000	16	21
40000 - 50000	25	22
50000 - 60000	22	13
60000 - 70000	20	6
70000 - 80000	11	8

1. What do you think of the two wages distribution ? Would you be better off graduating from Law or Business School (considering only wages ?)

6 Speedy's Network

Speedy, a telecoms firm, has just launched a new ad campaign claiming the following : "We have the speedest network with an average download speed at 42.0MB/s". Indeed, a study made by the competent authorities had issued a report comparing networks of the telecoms firms on the national market. They made 66 measurements of the speed in each network at different times during the day and found the following results :

Mb/s	Speedy	Peach
0 - 10	10	0
10 - 20	5	8
20 - 30	6	10
30 - 40	13	12
40 - 50	7	18
50 - 60	10	16
60 - 70	5	1
70 - 80	4	1
80 - 90	2	0
90 - 100	4	0

1. Assuming that the measurements inside a bin are equally distributed among this bin, what is the average speed of each network.
2. What are the Q1, median, Q3 classes for each network ?
3. Bob wants a speed network, which network would you advise him to choose ?

7 Deforestation and population density

Download the attached excel file. The excel file contains data on the average annual forest loss over the period 1981-19990 expressed as a percentage of total forest area for 70 tropical countries along with data on population density (number of people per thousand hectares).

1. Using the data, calculate and interpret the mean, standard deviation, min and maximum of deforestation and population density.
2. What is the correlation coefficient ? Comment.
3. Calculate and interpret the R^2.