

Choose only one exercise from exercise 1 or 2 and solve the obligatory exercise 3.

Exercise 1: (10 pts)

The table below shows the evolution of the number of people working in the private sector in a certain city.

Year	1980	1985	1990	1995	2000	2005	2010
x_i : rank of the year	0	5	10	15	20	25	30
y_j : number of people in thousands on first of January of each year	210	230	290	360	420	490	560

- Solve the following:
 - Find the average rank of years (\bar{x}). (2 pts)
 - Find the average number of people working in the private sector in this city (\bar{y}). (2 pts)
 - Deduce then the coordinates of the average point G of this series. (2 pts)
 - Sketch the points cloud (x_i, y_i) and place the point G in an orthogonal coordinate system. (2 pts)
- Calculate the correlation coefficient of this series. Interpret the result obtained. (2 pts)

Exercise 2: (10 pts)

A cloths shop is considering purchasing a new set of 300 winter sweaters of two different categories in the month of February from a supplier. The sweaters are different between males and females. The low category costs 2\$, the high category costs 4\$. The expected selling price for the low category sweater is 6\$ and 8\$ for the high category. The shop's customers are 40% male 60% female. Within each sex, customers purchase the items at same proportions between the categories (i.e. half of each sex buy the low category and the other half buy the high category). The shop owner must sell the 300 items in the month of February or else he will have to sell the remaining in March for half the price. 300 customers who enter the shop are interested in purchasing the items each month. The supplier has one condition however: the shop owner must purchase the 300 items according to the following distribution:

category\sex	male	female
low	60	40
high	180	20

Should the shop owner accept the offer? Justify your answer.

Exercise 3: (10 pts) (Obligatory)

In a factory, three machines manufacture the same piece. The machine A produce in one day 30% of pieces. The machine B produces 30% of pieces in one day. The machine C produces in one day 40% of pieces. Percentages of defective pieces are 3% produced by machine A , 2% produced by machine B and 3% produced by machine C . One piece is randomly taken from the whole production of a day.

- Calculate the probability that this piece will come from machine A . (2.5 pts)
- Calculate the probability that this piece is defective given that it comes from machine A . (2.5 pts)
- Calculate the probability that this piece is defective (2.5 pts)
- Given that the chosen piece is defective, calculate the probability that the chosen piece comes from machine B . (2.5 pts)