



Always use 3 decimal places.

GROUP I

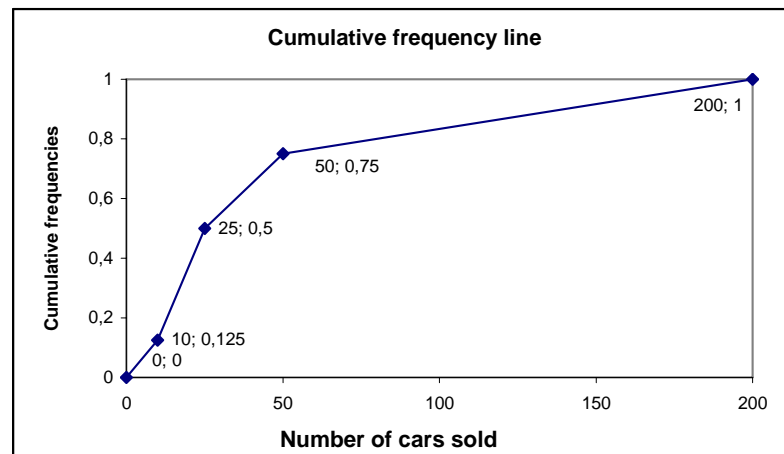
1. In January 2007 a car sales company studied its sales in different cities of Portugal and concluded that the distribution of car sales by city had a mean of 30, a standard deviation of 42 and a Gini index of 0,3. In December 2007 the same company tried to evaluate the evolution of these indicators. The Sales in December 2007 were:

City	Number of cars sold in December 2007
Braga	10
Bragança	40
Coimbra	12
Faro	24
Funchal	35
Leiria	18
Lisboa	200
Porto	80

- (3,5 val) a) Analyse the evolution of the measures of location, dispersion and concentration between January and December 2007.

- (1,0 val) b) Depict the Lorenz curve for Sales in December 2007.

2. Assume that in the study carried out by the firm for the sales in December 2007 you find the following picture.



- (1,25 val) a) Discuss to what extent this cumulative frequency line can represent the data shown in question 1, analysing, namely, the class intervals that might have been used. Justify.

- (1,25 val) b) Considering the data presented in the figure, compute the mean of the distribution. Why it may be different from the value compute in question 1?

GROUP II

1. Assume that you have the following information regarding the sales of SONAE in the last few years:

Table: Sales of SONAE

Year	2000	2001	2002	2003	2004	2005	2006
Sales (millions €)	5.751,0	6.385,9	6.275,7	6.259,7	6.634,0	7.174,4	4.936,6

- (1,0 val) **a)** Compute the absolute change and the rate of change of sales between 2000 and 2006.
- (1,0 val) **b)** Compute the average rate of change between 2000 and 2004, and between 2004 and 2006.
- (1,5 val) **c)** Considering the tow rates compute in b), compute the average rate of change between 2000 and 2006. [NOTE: if you were not able to compute b) assume two different rates].
- (1,0 val) **d)** Which will be the sales in 2007 if sales grow in that year at the same rate they have grown between 2000 and 2004.

GROUP III

1. Assume that you have the following data regarding the evolution of sales and prices for a given firm.

Table: Evolution of Sales Value and Prices

	2003	2004	2005	2006	2007
Sales Value (Index 2003=100)	100,0	101,6	103,7	106,7	110,2
Prices (Chain index)	102,0	102,9	102,6	103,1	102,3

- (2,0 val) **a)** Compute the 2004 fixed base index for sales at constant prices.
- (1,0 val) **b)** Analyse the nominal and real change of Sales in 2005. What justifies the difference?
- (2,5 val) **c)** If the firm had Sales of 12 540 Millions of euros in 2003, compute the value of sales in 2007 both at current and 2005 constant prices.

GROUP IV

To improve the management of stocks the owner of the firm "Ideal Calor e Frio, Limitada" is interested in knowing the relationship between the average monthly temperature (variable Y) and sales of heaters (variable X) for the months in which he sells heaters (October to May).

The data available from the previous year is the following:

Month	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Temperature	14	10	5	2	7	11	12	17
Sales	38	30	62	55	46	28	22	10

- (1,0 val) **1.** Characterize the relationship between the average monthly temperature and sales of heaters using the graphical analysis. Which graphic you should use for this analysis?
- (2,0 val) **2.** Assume you know that the variance of Y is 23,93, the variance of X 301,7 and the covariance between X and Y is -65,16. Compute the linear correlation coefficient, analyse the intensity of the relationship between the two variables and find the equation of the regression line.