

Always use 3 decimal places.

GROUP I

1. One economist from the Competition Authority in a given country is analysing the market in a given industry and has the following information:

Table: Distribution of firms by sales class

Sales (euros)	% companies
0 – 100.000	42
100.000 – 1.000.000	27
1.000.000 – 5.000.000	18
5.000.000 – 50.000.000	11
>50.000.000	2

Source: Business association

- (1,50 val) a) Depict graphically the simple and cumulative frequencies of the distribution.
- (1,00 val) b) Compute the mean and median value of the distribution.
- (1,00 val) c) Compute the standard deviation and the coefficient of variation of the distribution.
- (0,50 val) d) Taking into account the measures computed, analyse and explain the behaviour of the distribution in terms of symmetry.
- (1,50 val) e) Taking into account that the Competition Authority is concerned with the possibility that large firms have a dominant position in this market discuss that issue, considering the appropriate indicators.
- (1,50 val) f) Considering the data on new born firms and firms that close, that economist estimates that in the current year a number of firms corresponding to 5% of the stock in the previous year are born, all of them belonging to the first class of sales. In the same period a number of firms corresponding to 4% of the stock in the previous year is going to close, being these firms that die uniformly distributed across size classes. Compute the mean of the new distribution

GROUP II

1. Consider the following information on the evolution of production of a given firm.

Table: Information on sales

Year	2010	2011	2013	2014	2015
Production growth (%)	2,9	-2,2	-1,2	2,3	1,8

Source: Management reports

- (1,00 val) a) Compute for those years that is possible the chain index and 2012 fixed base index of production.
- (1,00 val) b) Which was the sales growth rate between 2012 and 2015?
- (1,00 val) c) Which was the annual average growth rate of production between 2009 and 2011?
- (1,50 val) d) How much have production grown in 2012 in order to having production growing 5.1% between 2009 and 2015.

GROUP III

1. One knows that the sales of a given company were **145,3 million euros in 2010** and one knows the following information on the evolution of sales.

Table: Information on the evolution of sales

Sales (current prices)	$r_{2009,2008}=2,5\%$	$\delta_{2010,2008}=4,7\%$	$i_{2011,2009}=100,3$	$i_{2012,2011}=104,1$	$\delta_{2013,2010}=-3,2\%$	$r_{2014,2013}=1,9\%$	$i_{2015,2009}=98,2$
Prices (2008=100)	2009=102,2	2010=104,1	2011=106,2	2012=109,3	2013=111,2	2014=113,1	2015=115,3

Fonte: Relatórios de gestão

- (1,50 val) a) Compute the 2008 fixed base index of sales.
- (1,50 val) b) Compute for those years that it is possible the value of sales of this company at 2009 prices
- (1,00 val) c) Compute the value of sales of this company in 2015 at 2013 at 2010 constant.
- (1,50 val) d) If in 2016 the product prices of this economy increase 3,2% and the volume of sales increase 2% compute the value of sales in 2016 both at current and 2008 prices.

GROUP IV

1. The coordinator of a given company knows that its sales growth is related to growth in its client markets. In order to have a model that allows for the forecast of sales growth he wants to estimate the relationship between the two variables. For that purpose he collected the historical information on the two variables and got the following results:

Mean of sales growth = 3,76 Mean of income growth in the main markets = 5,37
 Variance of sales growth = 2,465 Variance of income growth in the main markets= 3,5673
 Covariance between sales growth and increase of income in the main markets = 1,039

- (0,50 val) a) Say which should be the dependent and independent variable.
- (1,25 val) b) Compute the parameters of the regression line and comment the respective signs and values.
- (1,25 val) c) Comment the following sentence: "If one has information on the income growth in client markets and use that information in parallel with the regression equation computed in b) one can estimate efficiently sales".