University of Padova

Master's degree in *Computational Finance*

Regression and Time Series Models

Exercises on descriptive statistics

Exercise 1
Consider the following variables measured on the statistical units detailed in parenthesis:
1) Size of the resident population (Municipalities);
2) Nationality (E.U. Citizens);
3) Number of murderers (Regions);
4) Income pro-capite (Regions);
5) Percentage of employed by sector (Region);
6) Education level (Citizens);
7) Eye color (Students of Computational Finance, Padova);
8) Number of children per woman (Italiana population).
Specify the type of variable (nominal, ordinal, discrete, continuous).

Exercise 2
An insurance company would like to determine the proportion of all medical doctors who have been involved in one or more malpractice lawsuits. The company selects 500 doctors at random from a professional directory and determines the number in the sample who have been involved in a malpractice lawsuit. Determine the variable, the population, the sample, the parameter and the statistic.

Exercise 3
Determine the correct data type (quantitative or qualitative) in the following cases. Indicate whether quantitative data are continuous or discrete.

a. The number of pairs of shoes you own
b. the type of car you drive
c. the distance from your home to the nearest grocery store
d. the number of classes you take per school year
e. the type of calculator you use
f. weights of sumo wrestlers
g. number of correct answers on a quiz
h. IQ scores (This may cause some discussion.)

Exercise 4
For the following cases, identify the type of data that would be used to describe a response (quantitative discrete, quantitative continuous, or qualitative), and give an example of the data.

a. Number of tickets sold to a concert
b. percent of body fat
c. favorite baseball team
d. time in line to buy groceries

e. number of students enrolled at Evergreen Valley College
f. most-watched television show
g. brand of toothpaste
h. distance to the closest movie theatre
i. age of executives in Fortune 500 companies
j. number of competing computer spreadsheet software packages

Exercise 5
Fifty part-time students were asked how many courses they were taking this term. The (incomplete) results are shown below:

Number of courses	Frequency	Relative frequency	Cumulative relative frequency
1	30	0.6	
2	15		
3			

a) Fill in the blanks in the table.

b) What percent of students take exactly two courses?

c) What percent of students take one or two courses?

Exercise 6
The number of books bought by 50 part-time college students at ABC College is:
1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 2; 2; 2; 2; 2; 2; 2; 2; 2; 2; 3; 3; 3; 3; 3; 3; 3; 3; 3; 3; 3; 3; 3; 3; 3; 3; 3; 3 4; 4; 4; 4; 4; 4; 5; 5; 5; 5; 5; 6; 6

a) Compute the absolute and relative frequencies.

b) Compute absolute and relative cumulative frequencies.

c) Draw a bar or a lollipop plot.

d) Determine the mode, the median and the mean of the variable.

e) Compute the variance.

f) Draw the empirical distribution function.

Exercise 7
Construct the histogram of the following frequency distribution of the turnover of some companies in thousands of euros:

Turnover	Company
$[1-40)$	33
$[40-70)$	25
$[70-100)$	18
$[100-120)$	9

Exercise 8
The time employed by 5 different machines to produce an item is: 15, 20, 30, 18, 23.

a) Which is the mean production time?

b) Compute the variance.

Exercise 9
The number of small firms failures in 28 Italian provinces is:
2; 24; 25; 16; 17; 5; 22; 12; 21; 22; 7; 21; 3; 11; 7; 13; 2; 17; 8; 15; 7; 6; 14; 3; 3; 11; 18; 12.

a) Compute the mode, the mean and the median of the number of failures;

b) compute the variance, the range and the interquartile range;

c) construct the boxplot.

Exercise 10
The closing price (in dollars) of stock A in the past 5 days is:
3.20, 3.50, 3.30, 3.90, 4.10
The closing price (in dollars) of stock B in the past 5 days is:
34.10, 33.20, 33.50, 33.90, 33.30

a) Compute the standard deviation and the coefficient of variation;

b) which stock is less risky?

Exercise 11
The following table contains the grades obtained by 10 students at the exams of Mathematics, Statistics and Law.

Student	**Grade Math**	**Grade Stat**	**Grade Law**
1	30	28	26
2	28	26	25
3	25	26	26
4	25	25	27
5	28	30	25
6	18	22	24
7	20	24	26
8	20	25	25
9	25	24	28
10	30	30	24

a) Draw all the scatter plots;

b) compute the correlations between variables and comment.

Exercise 12
For each of the following data sets, state whether the data are symmetrical, skewed to the left, or skewed to the right computing the skewness coefficient

a) 1; 1; 1; 2; 2; 2; 2; 3; 3; 3; 3; 3; 3; 3; 3; 4; 4; 4; 5; 5

b) 16; 17; 19; 22; 22; 22; 22; 22; 23

c) 87; 87; 87; 87; 87; 88; 89; 89; 90; 91