Exercise 1. Determine what the population, variable, and data referred to in the following study.

We want to know the number of extracurricular activities in which high school students participate. We randomly surveyed 100 high school students. Three of those students were in 2, 5, and 7 extracurricular activities, respectively.

Exercise 2. Specify for each of the following variables whether it is qualitative, quantitative, continuous, discrete, ordinal or nominal : number of children in a family, color of eyes, socio-professional category, city of birth, level of education, salary, weight, gender, age, mother language , type of car, height, IQ scores.

Exercise 3. In a survey of 40 families in a village, the number of children per family was recorded and the following data obtained

$$
\begin{array}{cccccccc}
1 & 0 & 3 & 2 & 1 & 5 & 6 & 2 \\
2 & 1 & 0 & 3 & 4 & 2 & 1 & 6 \\
3 & 2 & 1 & 5 & 3 & 3 & 2 & 4 \\
2 & 2 & 3 & 0 & 2 & 1 & 4 & 5 \\
3 & 3 & 4 & 4 & 1 & 2 & 4 & 5
\end{array}
$$

(1) Determine what the population Ω, variable X for this data. What type of this data ? Determine the modalities set $X(\Omega)$.

(2) Present the above data in a frequency table showing the following columns ; relative frequency, cumulative frequency, relative cumulative frequency.

(3) Construct a bar chart and a frequency polygon of this data.

(4) Construct a cumulative frequency curve.

(5) Calculate $\overline{X}$, $VarX$, σ_X, Q_1, $M(=Q_2)$, Q_3 and the mode for this data. Discuss the skewness of the distribution.

(6) Construct the box-plot for these data.

Exercise 4. Find the mean, median and mode for the set of numbers

(a) 3, 5, 2, 6, 5, 9, 5, 2, 8, 6 ;

(b) 51.6, 48.7, 50.3, 49.5, 48.9.

Exercice 5. Construct a bar chart an a pie chart for the data set below, a grade distribution for a college class.

Grade	A	B	C	D
Number of Students	9	12	7	2

Exercise 6. Construct a pie chart and histogram for the frequency distribution below, the daily high temperature (in degrees Fahrenheit) in a particular city over the last 40 days.

Daily High Temperature	$[40, 45[$	$[45, 50[$	$[50, 55[$	$[55, 60[$
Frequency	6	12	17	5

Exercice 7 : In a factory, the time during working hours in which a machine is not operating as a result of breakage or failure is called the 'downtime". The following distribution shows a sample of 100 downtimes of a certain machine (rounded to the nearest minute) :

Downtime	[0, 10[	[10, 20[	[20, 30[	[30, 40[	[40, 50[	[50, 60[	[60, 70[	[70, 80[	[80, 90[
Frequencies	3	13	30	25	14	8	4	2	1

(1) With reference to the above distribution, calculate (a) the mean $\overline{X}$. (b) the standard deviation σ_X (c) the median. (d) the quartiles Q1 and Q3., (e) the range (f) the coefficient of variation (g) the interquartile range. Discuss the skewness of the distribution.

(2) Construct a frequency histogram and the frequency polygon.

(3) Calculate the number of Downtimes which are within $\overline{X}$ and $\overline{X} + \sigma_X$.

(4) Construct a smoothed cumulative graph. Determine from the graph the median and the quartiles

(5) Construct the box-and-whisker plot.

Exercise 8. Consider the following frequency distribution of weights of 150 bolts :

Weight	[5, 5.01[	[5.01, 5.02[	[5.02, 5.03[	[5.03, 5.04[	[5.04, 5.05[	[5.05, 5.06[	[5.06, 5.07[	[5.07, 5.08[	[5.08, 5.09[
Frequency	4	18	25	36	30	22	11	3	1

(a) Calculate the mean and standard deviation of the weights of bolts to three decimal places.

(b) Calculate from the frequency distribution, the number of bolts which are within one standard deviation of the mean.

(c) Suppose that each bolt has a nut attached to it to make a nut-and-bolt. Nuts have a distribution of weights with a mean of 2.043 grams and standard deviation 0.008. Calculate the standard deviation of the weights of nut-and-bolts.

Exercise 9. Salaries paid last year to supervisors had a mean of 25000 DA with a standard deviation of 2000 DA. What will be the new mean and standard deviation if all salaries are increased by 2500 ?