

Final Exam

Exercise n°1 : (9 marks)

A car manufacturer wants to study the relationship between a car's fuel consumption (Y) and its speed (X). The 10 measurements are given in the table below :

x_i	50	60	80	90	95	100	110	120	130	140
y_i	3	4	5	5.5	6	6.5	7.5	8.5	10	11.5

- a) Construct a scatterplot for the data .
- b) What can we say about the relationship between X and Y ?
- c) Let $Z = \ln Y$. Complete the table

x_i	50	60	80	90	95	100	110	120	130	140
Z_i										

- d) Determine the equation of the regression line from z to x using the method of least squares .
- e) Deduce the equation of y in terms of x.
- f) Estimate the fuel consumption of a vehicle travelling at 150 km/h ?

Exercise n°2 (7 marks)

A box contains three balls numbered 2, 3 and 5. Two balls are drawn in successively with the drawn ball being returned to the box. . Let X be the sum of the numbers obtained.

- a) Find the sample space Ω of this random experiment.
- b) Find the probability distribution of X, its expectation $E(X)$ and its variance $V(X)$.
- c) Let $Y = 3X + 10$. Deduce its expectation $E(Y)$ and its variance $V(Y)$.

Exercise n°3 (4 marks)

Two machines A and B respectively produce 65% and 35% of the total number of parts manufactured in a factory. The percentages of defective parts produced by these machines are 3% and 2% respectively. If a part selected at random, find the probability :

- a) that a part is defective.
- b) that a defective part comes from A.
- c) that a non-defective part comes from B.