

Abdelhafidh **Boussouf** Mila University Center
 Department of Mechanical Engineering
 Module: Probability and Statistics (PST)
 2nd Year EM, GM

Worksheet : N°3

Exercise 1:

The number of boys in two hundred families with four children has been recorded. The following table was obtained:

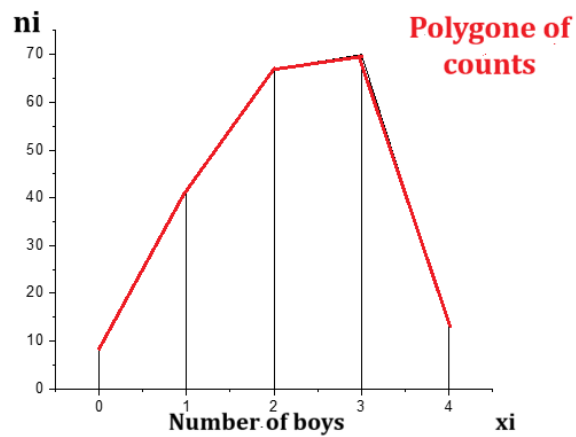
1. Define the character studied and give its nature.
2. What does xi and ni represent?
3. Calculate frequencies and cumulative frequencies.
4. Graph this data and plot the counts polygon.

xi	0	1	2	3	4
ni	8	42	67	70	13

Solution :

Population	200 families with four children
Statistical unit	A family
1. Define the character studied and give its nature?	Number of boys/ Discrete quantitative
2. What does xi and ni represent?	xi : Number of boys: the modalities ni : Number of families: partial counts

x_i	0	1	2	3	4	Total
n_i	8	42	67	70	13	200
f_i	0.04	0.21	0.335	0.35	0.065	1
$f_i\%$	4%	21%	33.5%	35%	6.5%	100%
$F_i = \sum f_i$	0.04	0.25	0.585	0.935	1	



Bar chart representing the number of boys in 200 families with 4 children

Exercise 2:

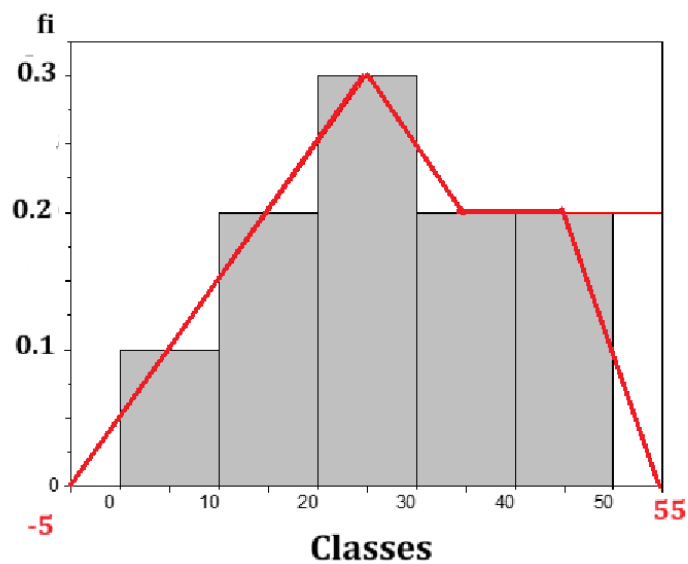
At a manufacturer of plastic tubes, a sample of 100 tubes was taken and the diameter was measured in decimeters.

1. Complete the statistical table.
2. Graph this distribution and plot the frequency polygon

Diameter	[0-10[	[10-20[	[20-30[	[30-40[	[40-50]
Number of Tubes	10	20	30	20	20

Solution:

Classes	[0-10[	[10-20[	[20-30[	[30-40[	[40-50]	Total
ni	10	20	30	20	20	100
ai	10	10	10	10	10	
fi	0.1	0.2	0.3	0.2	0.2	1
Ci	5	15	25	35	45	



Histogram that represents the diameter of tubes at a manufacturer of plastic tubes

Exercise 3:

Financial specialists have just set up a new account for BNA bank customers. In order to verify its impact on customers, 50 deposits are randomly taken from the EC accounts. The amounts deposited are (in hundreds of Dinars):

59 101 76 86 99 87 99 101 77 58 87 66 82 59 77 81 89 114 97 87 99 77 77 99 79 88 107
 86 89 76 71 80 83 79 100 98 77 84 81 89 85 86 85 83 85 67 83 88 75 100 60 90 98 68 62
 78 65 101 99 102

- a) What is the character studied and its nature?
- b) Group the values of this sample into classes, then build the statistical table.

Solution:

- 1. The character studied the deposits, Quantitative discrete
- 2. Since there are more than 20 modalities, class formation involves transforming data into continuous distribution, using Sturges' rule.

Number of classes $k = 1 + (3.322 \cdot \log n) = 1 + (3.322 \cdot \log 60) = 6.9 \approx 7$

k : Number of Classes (Rounded to the nearest integer)

n : Total number of observations = 60

a : Classe size

E : the range = $X_{max} - X_{min} = 114 - 58 = 56$

$a = E/k = 56/6.9 = 8,11 \approx 8$

Classes (Amount in DA)	[58-66[	[66-74[	[74-82[	[82-90[	[90-98[	[98-106[	[106-114]	Total
ni	6	4	14	19	2	13	2	60