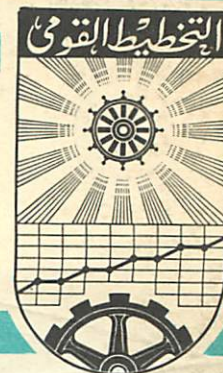


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STATISTICAL LABORATORY EXERCISE
BOOK

by

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Introduction

It is well known that in statistics as well as in any other branch of science, the students should practice its applications. The students need not only to learn how to apply statistical techniques in the sense of knowing how to compute numerical results, but they should also learn when & why these techniques should be applied in actual practice.

This exercise book is mainly intended for the members of the long term training course in the Institute of National Planning. It will also meet the needs of the students in the university who attend courses in Statistics at any level.

It covers most of the selected topics which the planners or the experimenters may require. Each topic begins with an instruction including a summary of the formulae, a solved numerical example and then a number of exercises to be done by the students. Some of these exercises are based on the data extracted from the problems undertaken by members and research workers in the institute.

I am greatly indebted to Dr. S. Hamed - the Director of the Operation Research Centre - for his encouragement and his

suggestion of adding solved numerical examples.

I would like to thank Mr. Heussin & Mr. Nabil for helping in solving the examples. Finally I would like also to thank Miss. Nadia & Miss. Elen for the great care they have taken in typing this exercise book.

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Moharran W. Mahmoud.

1- FREQUENCY DISTRIBUTIONS AND THEIR GRAPHICAL REPRESENTATION:-

Example (1):

Given the individual measurements of the height of 100 students as follows:

132	126	87	94	107	137	146	116	111	102
171	93	112	123	113	159	102	65	79	126
128	125	115	127	88	139	120	147	68	102
56	82	131	126	141	153	138	93	118	92
164	111	111	89	146	145	111	112	83	103
191	112	105	133	129	100	71	110	134	150
116	115	80	93	63	153	112	148	132	116
112	170	87	154	120	115	96	112	108	117
114	92	109	138	121	98	108	96	110	182
146	163	121	75	115	76	157	121	134	106

a- From the frequency distribution with equal intervals.

b- Draw :

The histogram

The frequency polygon

The frequency curve

c- Draw the cumulative frequency distribution.

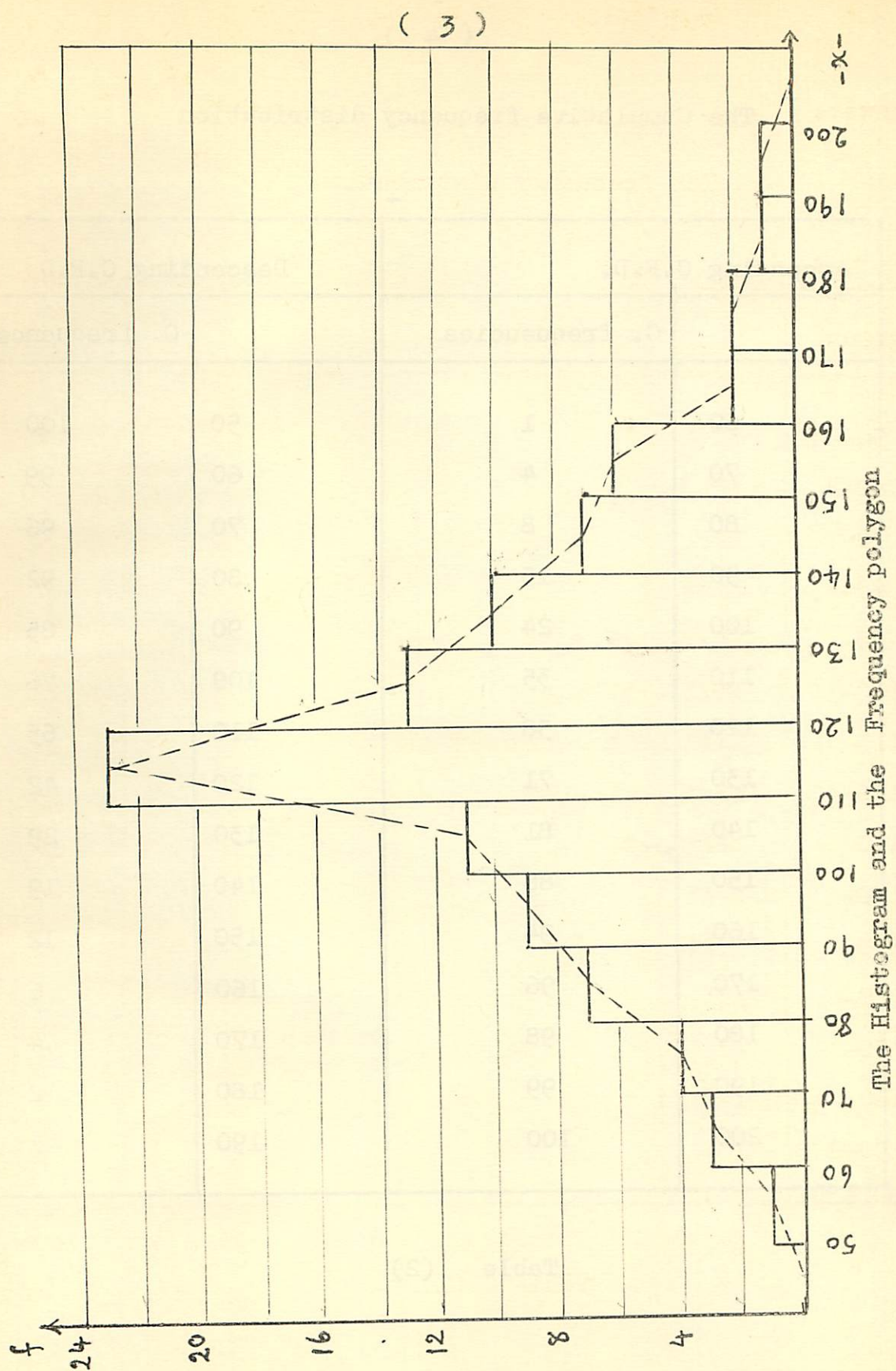
Answer:

The frequency distribution

groups	tabulation	frequency
50-	1	1
60-	111	3
70-	1111	4
80-	1111 11	7
90-	1111 1111	9
100-	1111 1111 1	11
110-	1111 1111 1111 1111 111	23
120-	1111 1111 111	13
130-	1111 1111	10
140-	1111 11	7
150-	1111 1	6
160-	11	2
170-	11	2
180-	1	1
190-200	1	1

100

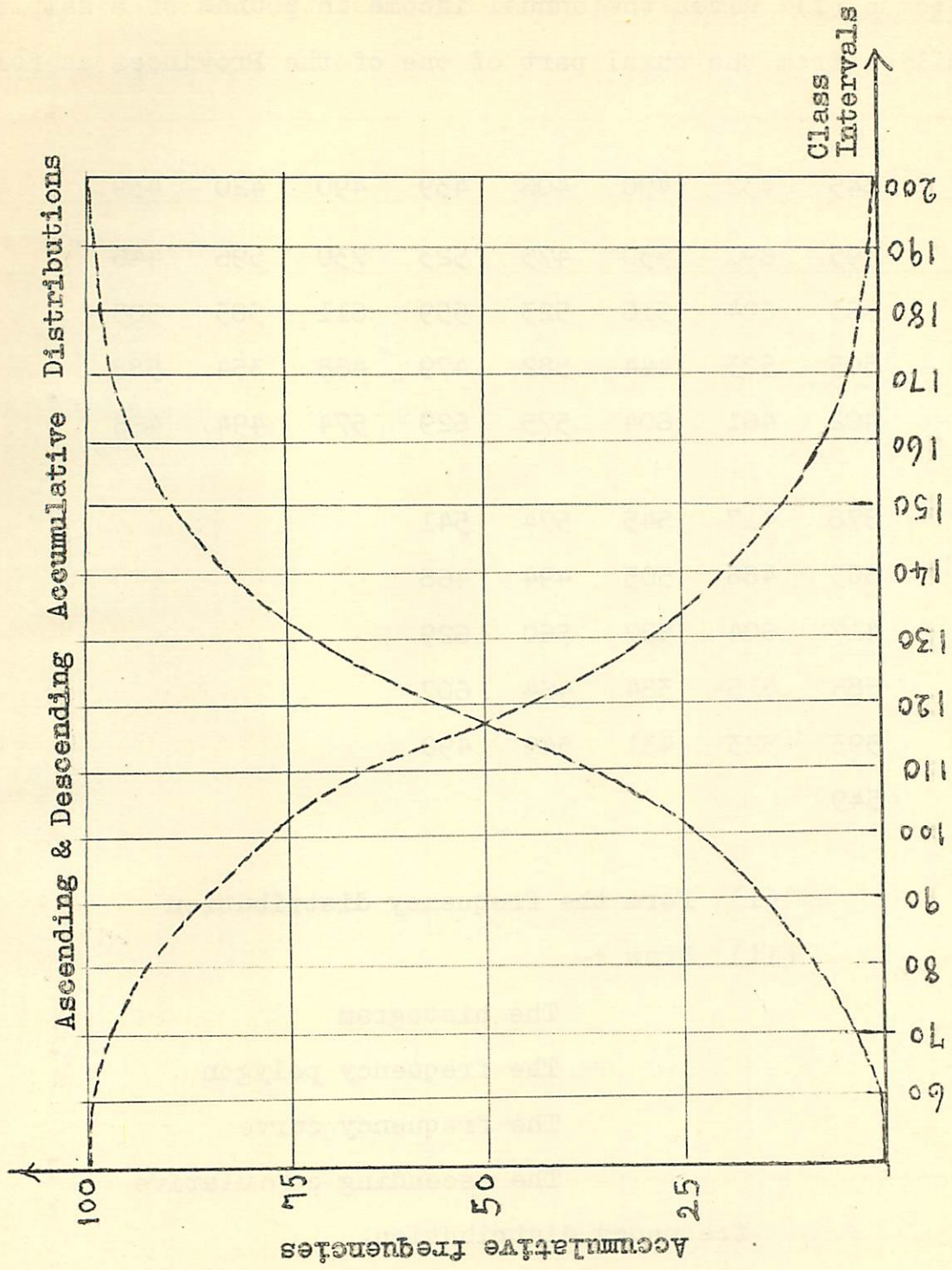
Table (1)



The Cumulative frequency distribution

Ascending C.F.D.		Descending C.F.D.	
	C. frequencies		C. frequencies
60	1	50	100
70	4	60	99
80	8	70	96
90	15	80	92
100	24	90	85
110	35	100	76
120	58	110	65
130	71	120	42
140	81	130	29
150	88	140	19
160	94	150	12
170	96	160	6
180	98	170	4
190	99	180	2
200	100	190	1

Table (2)



Exercise (1) Given the annual income in pounds of a sample of 66 families from the rural part of one of the Provinces as follows:-

345	432	490	406	439	490	420	439
395	691	530	475	523	730	596	446
563	624	516	523	559	611	585	505
505	523	444	582	479	468	354	588
402	461	604	575	629	574	494	468
578	417	545	574	541			
603	486	505	494	468			
417	604	527	560	629			
585	515	384	464	607			
593	523	431	549	490			
549							

(i) Form the frequency distribution

(ii) Draw :-

The histogram

The frequency polygon

The frequency curve

The ascending cumulative frequency distribution.

2- MEASURES OF LOCATION
(Averages)

(2.1) The Mean:

(1) For Ungrouped data use:

$$\bar{X} = \frac{1}{n} \sum X \quad (1)$$

II- For grouped data use :

$$\bar{X} = \frac{1}{n} \sum fX \quad (2)$$

where f denotes the frequencies and X here denotes the mid points of the class intervals

III- In the case of equal intervals use:

$$\bar{X} = a + l d$$

where a is an arbitrary origin

l the length (size) of the class interval

& $d = \frac{x - a}{l}$ (x = mid points of class intervals)

In example (1), calculate the mean using the above formulae.

(8)

Table (3)

groups	frequencies	X	$d = \frac{X - a}{l}$
50 -	1	55	-7
60 -	3	65	-6
70 -	4	75	-5
80 -	7	85	-4
90 -	9	95	-3
100 -	11	105	-2
110 -	23	115	-1
120 -	13	125	0
130 -	10	135	1
140	7	145	2
150 -	6	155	3
160 -	2	165	4
170 -	2	175	5
180 -	1	185	6
190-200	1	195	7
	100		

$$\begin{aligned} \sum f d &= -72 \\ \bar{X} &= a + \frac{\sum f d}{n} \\ a &= 125, \quad l = 10 \\ \bar{X} &= 125 - 10 \times \frac{72}{100} = 117.8 \end{aligned}$$

Exercises :

In the following exercises :

a - Draw :

- The histogram
- The frequency polygon
- The frequency curve
- The cumulative frequency distribution

b - Calculate the mean

(2)

X	f
28 -	3
29 -	3
30 -	7
31 -	56
32 -	133
33 -	622
34 -	1347
35 -	1960
36 -	1647
37 -	878
38 -	277
39 -	60
40 -	5
41 - 42	1

(3)

X	f
45 -	3
75 -	12
105 -	44
135 -	169
165 -	590
195 -	1047
225 -	916
255 -	416
285 -	136
315 -	35
345 -	4
375 - 405	1