Exercise – 22.1

1.   What do you understand by the word "statistics" in
(i)   Singular form
(ii)   Plural form?
Sol:
The word "Statistics" is used in both its singular as well as its plural senses.
(i)   **In singular sense:** Statistics may be defined as the science of collection, presentation, analysis and interpretation of numerical data
(ii)   **In plural sense:** Statistics means numerical facts or observations collected with definite purpose
(iii)   **For example:** Income and expenditure of persons in a particular locality, number males and females in a particular town are statistics.

2.   Describe some fundamental characteristics of statistics.
Sol:
Fundamental characteristics of statistics:
1. A single observation does not form statistics are a sum total of observation
2. Statics are expressed quantitatively not qualitatively
3. Statistics are collected with definite purpose
4. Statistics in an experiment are comparable and can be classified various groups.

3.   What are (i) primary data? (ii) secondary data? Which of the two – the primary or the secondary data – is more reliable and why?
Sol:
The word data means information statistical data and of two types
(i) Primary data, (ii) Secondary data
(i)   **Primary data:** when an investigator collects data himself with a definite plan or design in his (her) mind is called primary data
(ii)   **Secondary data:** data which are not originally collected rather obtained from published or unpublished sources are known as secondary data.
Secondary data are collected by an individual or an institution for some purpose and are used by someone else in another context
Primary data are reliable and relevant because they are original in character and are collected by some individuals or by research bodies.

4.   Why do we group data?
Sol:
The data obtained in original form are called raw data. Raw data does not give any useful information and is rather confusing to mind. Data is grouped so that it becomes

understandable can be interpreted. According to various characteristics groups are formed by us. After grouping the data, we are in position to make calculations of certain values which will help us in describing and analyzing the data.

5. Explain the meaning of the following terms:
(i)   Variable
(ii)   Class-integral
(iii)   Class-size
(iv)   Class-mark
(v)   Frequency
(vi)   Class limits
(vii)   True class limits

Sol:
(i)   Variable: Any character that can vary from one individual to another is called variable or variable
(ii)   Class interval: In the data each group into which raw data is considered is called a class-interval.
(iii)   Class-size: The different between the true upper limit and lower limit is called the class size of that class.
(iv)   Class mark: The middle value of the class is called as the class mark.

$$\text{Class mark} = \frac{\text{Upper Limit} + \text{Lower Limit}}{2}$$

(v)   Frequency: The number of observations corresponding to class is called its frequency.
(vi)   Class limits: Each class is bounded by two figures, called the class limits. The figures on the left side of the classes are called lower limits while figures on the right side are called upper limits.
(vii)   True class limits: if classes are inclusive eg $15 - 19, 20 - 24, 25 - 29, 30 - 34...........$

Then, true lower limit of class = upper limit of class $-0 \cdot 5$
And true upper limit of class = upper limit of class $+0 \cdot 5$
Example: true limits of the class 15-19 are $14 \cdot 5$ and $19 \cdot 5$
But if because classes are exclusive use like $10 - 20, 20 - 30, 30 - 40..........$
Here class limits and true class limits are the same.

6. The ages of ten students of a group are given below. The ages have been recorded in years and months:
$8 - 6, 9 - 0, 8 - 4, 9 - 3, 7 - 8, 8 - 11, 8 - 7, 9 - 2, 7 - 10, 8 - 8$
(i)   What is the lowest age?
(ii)   What is the highest age?
(iii)   Determine the range?

Sol:

The ages of ten students of a group are given below

$8-6, 9-0, 8-4, 9-3, 7-8, 8-11, 8-7, 9-2, 7-10, 8-8.$

(i)   Lowest age is 7 years, 8 months

(ii)   Highest age is 9 years, 3 months.

(iii)   Range = highest age – lowest age

      = 9 year, 3 months, 7 year, 8 months

      = 1 year, 7 months

7.   The monthly pocket money of six friends is given below: Rs. 45, Rs. 30, Rs. 40, Rs. 50, Rs. 25, Rs. 45.

(i)   What is the highest pocket money?

(ii)   What is the lowest pocket money?

(iii)   What is the range?

(iv)   Arrange the amounts of pocket money in ascending order.

Sol:

The monthly pocket money of six friends is given below:

Rs. 45, *Rs.* 30, *Rs.*40, Rs. 50, *Rs.* 25, *Rs.* 45.

(i)   Highest pocket money $= Rs.\ 50$

(ii)   Lowest pocket money $= Rs.25$

(iii)   Range $= 50 - 25$

      $= 25.$

(iv)   The cumulative amounts of pocket money in ascending order is

      Rs. 25, *Rs.* 30, *Rs.* 40, *Rs.* 45, *Rs.* 45, *Rs.* 50.

8.   Write the class-size in each of the following:

(i) $0-4,\ 5-9,\ 10-14$

(ii) $10-19,\ 20-29,\ 30-39$

(iii) $100-120,\ 120-140,\ 160-180$

(iv) $0-0.25,\ 0.25-0.50,\ 0.50-0.75$

(v) $5-5.01,\ 5.01-5.02,\ 5.02-5.03$

Sol:

(i) $0-4,\ 5-9, 10-14.$

      True class limits are $0 \cdot 5 - 4 \cdot 5, 4 \cdot 5 - 9 \cdot 5, 9 \cdot 5 - 14 \cdot 5.$

      $\therefore$ Class size $= 14 \cdot 5 - 9 \cdot 5 = 5$

(ii) $10-19,\ 20-29,\ 30-39.$

      True class limits $\rightarrow 10 \cdot 5 - 19 \cdot 5, 19 \cdot 5 - 29 \cdot 5, 29 \cdot 5 - 39 \cdot 5$

      Class size $= 39 \cdot 5 - 29 \cdot 5$

      $= 10$

(iii) $100 - 120, 120 - 140, 160 - 180.$

Here the class limits and true class limits are the same

∴ Class size $= 120 - 100$

$= 20$

(iv) $0 - 0 \cdot 25, 0 \cdot 25 - 0 \cdot 50, 0 \cdot 50 - 0 \cdot 75$

Here the class limits and true class limits are the same

∴ Class size $= 0 \cdot 25 - 0 = 0 \cdot 25$

(v) $5 - 5 \cdot 01, 5 \cdot 01 - 5 \cdot 02, 5 \cdot 02 - 5 \cdot 03.$

Here the class limits ad true class limits are the same

∴ Class size $= 5 \cdot 01 - 5 \cdot 0 = 0 \cdot 01.$

9.   The final marks in mathematics of 30 students are as follows:

53, 61, 48, 60, 78, 68, 55, 100,67,90

75,88,77,37,84,58,60,48,62,56

44, 58, 52, 64, 98, 59, 70, 39, 50, 60

(i)   Arrange these marks in the ascending order, 30 to 39 one group, 40 to 49 second group etc.

Now answer the following:

(ii)   What is the highest score?

(iii)   What is the lowest score?

(iv)   What is the range?

(v)   If 40 is the pass mark how many have failed?

(vi)   How many have scored 75 or more?

(vii)   Which observations between 50 and 60 have not actually appeared?

(viii)   How many have scored less than 50?

Sol:

The final marks in mathematics of 30 students are as follows:

53, 61, 48, 60, 78, 68, 55, 100, 67, 90, 75, 88, 77, 37, 84, 58, 60, 48, 62, 56, 44, 58, 52, 64, 98, 59, 70, 39, 50, 60.

(i)	Group	Observations
	I(30–39)	37, 39
	II(40–49)	44, 48, 48
	III(50–59)	50, 52, 53, 55, 56, 58, 58, 59
	IV(60–69)	60, 60, 60, 61, 62, 64, 67, 68
	V(70–79)	70, 55, 77, 78
	VI(80–89)	84, 88
	VII(90–99)	90, 98
	VIII(100–109)	100

(ii)   Highest score = 100

(iii) Lowest score = 37

(iv)   Range $= 100 - 37 = 63$

(v)   If 40 is the pass mark, 2 students have failed

(vi)   8 students have scored 75 or more

(vii) Observation 51, 54, 57 between 50 and 60 have not actually appeared

(viii) 5 students have scored less than 50

10.   The weights of new born babies (in kg) in a hospital on a particular day are as follows:

2.3, 2.2, 2.1, 2.7, 2.6, 3.0, 2.5, 2.9, 2.8, 3.1, 2.5, 2.8, 2.7, 2.9, 2.4

(i) Rearrange the weights in descending order.

(ii) Determine the highest weight.

(iii) Determine the lowest weight.

(iv) Determine the range.

(v) How many babies were born on that day?

(vi) How many babies weigh below 2.5 kg?

(vii) How many babies weigh more than 2.8 kg?

(viii) How many babies weigh 2.8 kg?

Sol:

The weights of new born babies (in kg) area as follows

$2 \cdot 3, 2 \cdot 2, 2 \cdot 1, 2 \cdot 7, 2 \cdot 6, 2 \cdot 5, 3 \cdot 0, 2 \cdot 8, 2 \cdot 9, 3 \cdot 1, 2 \cdot 5, 2 \cdot 8, 2 \cdot 7, 2 \cdot 9, 2 \cdot 4.$

(i)   The weights in descending order

$3 \cdot 1, 3 \cdot 0, 2 \cdot 9, 2 \cdot 9, 2 \cdot 8, 2 \cdot 8, 2 \cdot 7, 2 \cdot 7, 2 \cdot 6, 2 \cdot 5, 2 \cdot 5, 2 \cdot 4, 2 \cdot 3, 2 \cdot 2, 2 \cdot 1.$

(ii)   The highest weight $= 3 \cdot 1 kg$

(iii)   The lowest weight $= 2 \cdot 1 kg$

(iv)   Range $= 3 \cdot 1 - 2 \cdot 1 = 1 \cdot 0 kg$

(v)   15 babies were born on that particular day

(vi)   4 babies weight below $2 \cdot 5 kg$

(vii) Weight more than $2 \cdot 8 kg$ are 4-babies.

(viii) Weight $2 \cdot 8 kg \rightarrow 2$ babies

11.   The number of runs scored by a cricket. player in 25 innings are as follows:

26, 35, 94, 48, 82, 105, 53, 0, 39, 42, 71, 0, 64, 1.5, 34, 67, 0, 42, 124, 84, 54, 48, 139, 64, 47.

(i)   Rearrange these runs in ascending order.

(ii)   Determine the player, is highest score.

(iii) How many times did the player not score a run?

(iv)   How many centuries did he score?

(v)   How many times did he score more than 50 runs?

Sol:

The numbers of runs scored by a player in 25 innings are

26, 35, 94, 48, 82, 105, 53, 0, 39, 42, 71, 0, 64, 15, 34, 15, 34, 67, 0, 42, 124, 84, 54, 48, 139, 64, 47

(i) Runs in ascending order are 0, 0, 0, 15, 26, 34, 35, 39, 42, 42, 47, 48, 48, 53, 54, 64, 64, 67, 71, 82, 84, 94, 105, 124, 139.

(ii) The highest number = 139

(iii) The player did not score any run 3 times

(iv) He scored 3 centuries

(v) He scored more than 50 run 12 times.

12. The class size of a distribution is 25 and the first class-interval is 200-224. There are seven class-intervals.

(i) Write the class-intervals.

(ii) Write the class-marks of each interval.

Sol:

Given,

Class size = 25

First class interval $= 200 - 224$

(i) Seven class intervals are:

$200 - 240, 225 - 249, 250 - 274, 275 - 299, 300 - 324, 325 - 349, 350 - 374.$

(ii) Class mark of $200 - 224 = \dfrac{200 + 224}{2} = \dfrac{424}{2} = 212$

Class mark of $225 - 249 = \dfrac{225 + 249}{2} = \dfrac{474}{2} = 237$

Class mark of $250 - 274 = \dfrac{250 + 274}{2} = \dfrac{524}{2} = 262$

Class mark of $300 - 324 = \dfrac{300 + 324}{2} = \dfrac{624}{2} = 312$

Class mark of $325 - 349 = \dfrac{325 + 349}{2} = \dfrac{674}{2} = 337$

Class mark of $350 - 374 = \dfrac{350 + 374}{2} = \dfrac{724}{2} = 362.$

13. Write the class size and class limits in each of the following:

(i) 104, 114, 124, 134, 144, 154, and 164

(ii) 47, 52, 57, 62, 67, 72, 77, 82, 87, 92, 97 and 102

(iii) 12.5, 17.5, 22.5, 27.5, 32.5, 37.5, 42.5, 47.5

Sol:

(i) 104, 114, 124, 134, 144, 154 and 102

Class size $= 114 - 104 = 10$

Class mark	Lower class limit	Upper class limit	Class limit
104	$104 - \dfrac{10}{2} = 99$	$104 + \dfrac{10}{2} = 109$	99-109
114	$114 - \dfrac{10}{2} = 109$	$114 + \dfrac{10}{2} = 119$	109-119
124	119	129	119-129
134	129	139	129-139
144	139	149	139-149
154	149	159	149-159
164	159	169	159-169

(ii) 47, 52, 57, 62, 67, 72, 79, 82, 87, 92, 97, 1102

Class size $= 52 - 47 = 5$

Class mark	Lower class limit	Upper class limit	Class limit
47	$47 \cdot \dfrac{5}{2} = 44 \cdot 5$	$47 + \dfrac{5}{2} = 49 \cdot 5$	$44 \cdot 5 - 49 \cdot 5$
52	$49 \cdot 5$	$54 \cdot 5$	$49.5 - 54 \cdot 5$
57	$54 \cdot 5$	$59 \cdot 5$	$54 \cdot 5 - 59 \cdot 5$
62	$59 \cdot 5$	$64 \cdot 5$	$59 \cdot 5 - 64 \cdot 5$
67	$64 \cdot 5$	$69 \cdot 5$	$64 \cdot 5 - 69 \cdot 5$
72	$69 \cdot 5$	$74 \cdot 5$	$69 \cdot 5 - 74 \cdot 5$
77	$74 \cdot 5$	$79 \cdot 5$	$74 \cdot 5 - 79 \cdot 5$
82	$79 \cdot 5$	$84 \cdot 5$	$79 \cdot 5 - 84 \cdot 5$
87	$84 \cdot 5$	$89 \cdot 5$	$84 \cdot 5 - 89 \cdot 5$
92	$89 \cdot 5$	$94 \cdot 5$	$89 \cdot 5 - 94 \cdot 5$
97	$94 \cdot 5$	$99 \cdot 5$	$94 \cdot 5 - 99 \cdot 5$
102	$99 \cdot 5$	$104 \cdot 5$	$99 \cdot 5 - 104 \cdot 5$

(iii) Class size $= 17 \cdot 5 - 12 \cdot 5 = 5$

Class mark	Lower class limit	Upper class limit	Class limit
$12 \cdot 5$	$12 \cdot 5 - \dfrac{5}{2} = 10$	$12 \cdot 5 + \dfrac{5}{2} = 15$	$10 - 15$
$17 \cdot 5$	$17 \cdot 5 - 2 \cdot 5 = 15$	$17 \cdot 5 + 2 \cdot 5 = 20$	$15 - 20$
$22 \cdot 5$	$22 \cdot 5 - 2 \cdot 5 = 20$	$22 \cdot 5 + 2 \cdot 5 = 25$	$20 - 25$
$27 \cdot 5$	$27 \cdot 5 - 2 \cdot 5 = 25$	$27 \cdot 5 + 2 \cdot 5 = 30$	$25 - 30$

32·5	32·5−2·5＝30	32·5+2·5＝35	30−35
37·5	37·5−2·5＝35	37·5+2·5＝40	35−40
42·5	42·5−2·5＝40	42·5+2·5＝40	40−45
47·5	47·5−2·5＝45	47·5+2·5＝45	45−50

14. Following data gives the number of children in 40 families:

1,2,6,5,1,5, 1,3,2,6,2,3,4,2,0,0,4,4,3,2,2,0,0,1,2,2,4,3, 2,1,0,5,1,2,4,3,4,1,6,2,2.

Represent it in the form of a frequency distribution.

Sol:

Number of children	Tally marks	Number of families
0							5
1									7
2														12
3							5
4								6
5					3
6					3

15. The marks scored by 40 students of class IX in mathematics are given below:

81, 55, 68, 79, 85, 43, 29, 68, 54, 73, 47, 35, 72, 64, 95, 44, 50, 77, 64, 35, 79, 52, 45, 54, 70, 83, 62, 64, 72, 92, 84, 76, 63, 43, 54, 38, 73, 68, 52, 54.

Prepare a frequency distribution with class size of 10 marks.

Sol:

Marks	Tally marks	Frequency
20-30			1
30-40	|||	3
40-50	|||||	5
50-60	||||| |||	8
60-70	||||| |||	8
70-80	||||| ||||	9
80-90	|||||	4
90-100	||	2
		Total ＝ 40

16. The heights (in cm) of 30 students of class IX are given below:

155, 158, 154, 158, 160, 148, 149, 150, 153, 159, 161, 148, 157, 153, 157, 162, 159, 151, 154, 156, 152, 156, 160, 152, 147, 155, 163, 155, 157, 153.

Prepare a frequency distribution table with 160-164 as one of the class intervals.

Sol:

Height (in cm)	Tally marks	Frequency
145-149	‖‖	4
150-154	‖‖‖ ‖‖	9
155-159	‖‖‖ ‖‖‖ ‖	12
160-164	‖‖‖	5
		Total = 30

17. The monthly wages of 30 workers in a factory are given below:

83.0, 835, 890, 810, 835, 836, 869, 845, 898, 890, 820, 860, 832, 833, 855, 845, 804, 808, 812, 840, 885, 835, 836, 878, 840, 868, 890, 806, 840, 890.

Represent the data in the form of a frequency distribution with class size 10.

Sol:

Height (in cm)	Tally marks	Frequency
800-810	‖‖	3
810-820	‖	2
820-830	‖	1
830-840	‖‖‖ ‖‖	8
840-850	‖‖‖	5
850-860	‖	1
860-870	‖‖	3
870-880	‖	1
880-890	‖	1
890-900	‖‖‖	5
		Total = 30

18. The daily maximum temperatures (in degree celsius) recorded in a certain city during the month of November are as follows:

25.8, 24.5, 25.6, 20.7, 21.8, 20.5, 20.6, 20.9, 22.3, 22.7, 23.1, 22.8, 22.9, 21.7, 21.3, 20.5, 20.9, 23.1, 22.4, 21.5, 22.7, 22.8, 22.0, 23.9, 24.7, 22.8, 23.8, 24.6, 23.9, 21.1

Represent them as a frequency distribution table with class size 1°C.

Sol:

Maximum temperature (in degree celcius)	Tally marks	Frequency
$20 \cdot 0 - 21 \cdot 0$	‖‖‖ ‖	6
$21 \cdot 0 - 22 \cdot 0$	‖‖‖	5
$22 \cdot 0 - 23 \cdot 0$	‖‖‖ ‖‖	9
$23 \cdot 0 - 24 \cdot 0$	‖‖‖	5
$24 \cdot 0 - 25 \cdot 0$	‖‖	3

$25 \cdot 0 - 26 \cdot 0$	||	2
		Total = 30

19. Construct a frequency table with equal class intervals from the following data on the monthly wages (in rupees) of 28 laborers working in a factory, taking one of the class intervals as 210-230 (230 not included):

220, 268, 258, 242, 210, 268, 272, 242, 311, 290, 300, 320, 319, 304, 302, 318, 306, 292, 254, 278, 210, 240, 280, 316, 306, 215, 256, 236.

Sol:

Monthly wages (in rupees)	Tally marks	Frequency
210-230	||||	4
230-250	||||	4
250-270	|||||	5
270-290	|||	3
290-310	||||| ||	7
310-330	|||||	5
		Total = 28

20. The daily minimum temperatures in degrees Ce1siu& recorded in a certain Arctic region are as follows:

-12.5, -10.8, -18.6, -8.4, -10.8, -4.2, -4.8, -6.7, -13.2, -11.8, -2.3, 1.2, 2.6, 0, 2.4, 0, 3.2, 2.7, 3.4, 0, -2.4, -2.4, 0, 3.2, 2.7, 3.4, 0, -2.4, -5.8, -8.9, 14.6, 12.3, 11.5, 7.8, 2.9.

Represent them as frequency distribution table taking -19.9 to -15 as the first class interval.

Sol:

Since first class interval is frequency distribution with lower limit included and upper limit excluded is

Temperature	Tally marks	Frequency
$-19 \cdot 9 \; to \; -15$	||	2
$-15 \; to \; -10 \cdot 1$	||| ||||	7
$-10 \cdot 1 \; to \; -5 \cdot 2$	|||||	5
$-5 \cdot 2 \; to \; -0 \cdot 3$	||||	4
$-0 \cdot 3 \; to \; -4 \cdot 6$	||||| ||||| ||||| ||	17
Total		35

21. The blood groups of 30 students of class VIII are recorded as follows:

A, B, O, O, AB, O, A, O, B, A, O, B, A, O, O, A, AB, O, A, A, O, O, AB, B, A, O, B, A, B, O

Represent this data in the form of a frequency distribution table. Find out which is the most Common and which is the rarest blood group among these students.

Sol: Here 9 students have blood groups $A, 6$ *as* $B, 3$ as AB and as O.

So the table representing the data is as follows

Blood group	Number of students
A	9
B	8
AB	3
O	12
Total	30

As 12 students have the blood group O and 3 have their blood group is AB. Clearly, the most common blood group among these students is 0 and the rarest blood group among these students is 0 and the rarest blood group among these students is AB

22. Three coins were tossed 30 times. Each time the number of head occurring was noted down as follows:

0	1	2	2	1	2	3	1	3	0
1	3	1	1	2	2	0	1	2	1
3	0	0	1	1	2	3	2	2	0

Sol:

By observing the data given above following frequency distribution table can be constructed

Number of heads	Number of times (frequency)
0	6
1	10
2	9
3	5
Total	30

23. Thirty children were asked about the number of hours they watched T.V. programmers in the previous week. The results were found as follows:

1	6	2	3	5	12	5	8	4	8
10	3	4	12	2	8	15	1	17	6
3	2	8	5	9	6	8	7	14	12

(i) Make a grouped frequency distribution table for this data, taking class width 5 and one of the class intervals as 5 – 10.

(ii) How many children watched television for 15 or more hours a week?

Sol:

(i)   Class intervals will be $0-5, 5-10, 10-15, ...$

The grouped frequency distribution table is as follows

Hours	Number of children
$0-5$	10
$5-10$	13
$10-15$	5
$15-20$	2
Total	30

(ii)   The number of children, who watched TV for 15 or more hours a week is 2 (i.e., number of children in class interval $15-20$).

Exercise – 22.2

1.   Define cumulative frequency distribution.
Sol:
Cumulative frequency distribution: A table which displays the manner in which cumulative frequencies are distributed over various classes is called a cumulative frequencies (or) cumulative frequencies distribution table.

2.   Explain the difference between a frequency distribution and a cumulative frequency distribution.
Sol:
Frequencies table or frequency distribution is a method to represent raw data in the form from which one can easily understand the information contained in a raw data , where as a table which plays the manner in which cumulative frequencies are distributed over various classes is called a cumulative frequency distribution.

3.   The marks scored by 55 students in a test are given below:

Marks	0-5	5-10	10-15	15-20	20-25	25-30	30-35
No. of students	2	6	13	17	11	4	2

Prepare a cumulative frequency table:
Sol:

Marks	No. of students	Marks	Cumulative frequency
0-5	2	Less than 5	2
5-10	6	Less than 10	8
10-15	13	Less than 15	21

15-20	17	Less than 20	38
20-25	11	Less than 25	49
25-30	4	Less than 30	53
30-35	2	Less than 35	55
	N = 55		

4. Following are the ages of360 patients getting medical treatment in a hospital on a day:

Age (in years):	10-20	20-30	30-40	40-50	50-60	60-70
No. of Patients:	90	50	60	80	50	30

Construct a cumulative frequency distribution.

Sol:

Age (in years)	No. of students	Age (in years)	Cumulative frequency
10-20	90	Less than 20	90
20-30	50	Less than 30	140
30-40	60	Less than 40	200
40-50	80	Less than 50	280
50-60	50	Less than 60	330
60-70	30	Less than 70	360
	N = 360		

5. The water bills (in rupees) of 32 houses in a certain street for the period 1.1.98 to. 31.3.98 are given below:

56, 43, 32, 38, 56, 24, 68, 85, 52, 47, 35, 58, 63, 74, 27, 84, 69, 35, 44, 75, 55, 30, 54, 65, 45, 67, 95, 72, 43, 65, 35, 59.

Tabulate the data and resent the data as a cumulative frequency table using 70-79 as one of the class intervals.

Sol:

The minimum bill is *Rs* 24.

Maximum bill is *Rs* 95.

Range = maximum bill – minimum bill

$= 95 - 24$

$= 71$

Given class in terval is $70 - 79,$ So class size

$= 79 - 70 = 9$

$\therefore$ Number of classes $= \dfrac{\text{Range}}{\text{class size}} = \dfrac{71}{9}$

$= 7 \cdot 88$

∴. Number of classes = 8

The cumulative frequency distribution table is as

Bills	No. of houses (Frequency)	Cumulative frequency
16-25	1	1
25-34	3	4
34-43	5	9
43-52	4	13
52-61	7	20
61-70	6	26
70-79	3	29
79-88	2	31
88-97	1	32

6.   The number of books in different shelves of a library are as follows:

30, 32, 28, 24, 20, 25, 38, 37, 40, 45, 16, 20

19, 24, 27, 30, 32, 34, 35, 42, 27, 28, 19, 34,

38, 39, 42, 29, 24, 27, 22, 29, 31, 19, 27, 25

28, 23, 24, 32, 34, 18, 27, 25, 37, 31, 24, 23,

43, 32, 28, 31, 24, 23, 26, 36, 32, 29, 28, 21.

Prepare a cumulative frequency distribution table using 45-49 as the last class interval.

Sol:

Minimum number of book shelves is 16 and maximum number of book shelves is 45

Range = maximum B. S – Minimum B. S

= 45 – 16

= 29

Given class interval = 45 – 49. So class size

= 49 – 45 = 4.

∴. Number of classes $= \dfrac{\text{Range}}{\text{Class size}} = \dfrac{29}{4} = 7 \cdot 25$

⇒ Number of classes = 8.

The cumulative frequencies distribution is as

No. of Books	No. of shelves (Frequency)	Cumulative frequency
13-17	1	1
17-21	6	7
21-25	11	18
25-29	15	33
29-33	12	45
33-37	5	50

37-41	6	56
41-45	3	59
45-49	1	60

7. Given below are the cumulative frequencies showing the weights of 685 students of a school. Prepare a frequency distribution table.

Weight (in kg)	No. of students
Below 25	0
Below 30	24
Below 35	78
Below 40	183
Below 45	294
Below 50	408
Below 55	543
Below 60	621
Below 65	674
Below 70	685

Sol:

Weight (in kg)	No. of students	Class interval	Frequency
Below 30	24	25-30	24-0=24
Below 35	78	30-35	78-24=54
Below 40	183	35-40	183-78=105
Below 45	294	40-45	294-183=111
Below 50	408	45-50	408-294=114
Below 55	543	50-55	543-408=135
Below 60	621	55-60	621-543=78
Below 65	674	60-65	674-621=53
Below 70	685	65-70	685-674=11

8. The following cumulative frequency distribution table shows the daily electricity consumption (in kW) of 40 factories in an industrial state:

Consumption (in kW)	No. of Factories
Below 240	1
Below 270	4
Below 300	8
Below 360	24
Below 390	38
Below 420	40

(i)   Represent this as a frequency distribution table.

(ii)   Prepare a cumulative frequency table.

Sol:

(i)

Consumption (in kg)	No. of factories	Class interval	Frequency
Below 240	1	0-240	1
Below 270	4	240-270	4-1=3
Below 300	8	270-300	8-4=4
Below 330	24	300-330	24-8=16
Below 360	33	330-360	33-24=9
Below 390	38	360-390	38-33=5
Below 420	40	390-420	40-38=2

(ii)

Class interval	Frequency	Consumption (in kw)	No. of factories
0-240	1	More than 0	40
240-270	3	More than 240	40-1=39
270-300	4	More than 270	39-3=36
300-330	16	More than 300	36-4=32
330-360	9	More than 330	32-16=16
360-390	5	More than 360	16-9=7
390-420	2	More than 390	7-5=2
		More than 420	2-2=0
	N = 40		

9.   Given below is a cumulative frequency distribution table showing the ages of people living in a locality:

Ace in years	No. of persons
Above 108	0
Above 96	1
Above 84	3
Above 72	5
Above 60	20
Above 48	158
Above 36	427
Above 24	809
Above 12	1026
Above 0	1124

Prepare a frequency distribution table

Sol:

Age (in years)	No. of persons	Class interval	Frequency
Above 0	1124	0-12	1124-1026=98
Above 12	1026	12-24	217
Above 24	809	24-36	382
Above 36	427	36-48	269
Above 48	158	48-60	138
Above 60	20	60-72	15
Above 72	5	72-84	5-3=2
Above 84	3	84-96	3-1=2
Above 96	1	96-108	1-0=1