

14. STATISTICS

Question 1

For the following frequency distribution:

Class	10-20	20-30	30-40	40-50	50-60
Frequency	6	5	8	25	20

- What is the lower limit of frequency 20?
- Write the class mark of above frequency distribution.
- What is the upper limit of frequency 5?
- Find $\sum F_i$.

Question 2

Answer the following from given data

class interval	15-30	30-45	45-60	60-75	75-90
Frequency	6	18	19	4	11

- identify the modal class
- upper limit of modal class
- frequency of modal class
- frequency of class succeeding the modal class
- frequency of class preceding the modal class

Question 3

Find the value of x if sum of frequencies is 40 and complete cumulative frequencies.

Class interval	Frequency	Cumulative frequency
10-20	5	
20-30	8	
30-40	15	
40-50	X	
50-60	10	
	N=40	

Question 4

Find the mean of following distribution by assumed mean method.

Marks	No. Of students
Below 10	4
Below 20	10
Below 30	18
Below 40	28
Below 50	40
Below 60	70

Question 5

The mean of the following data is 50. Find the missing frequencies p_1 and p_2

C.I.	frequency
0-20	17
20-40	p_1
40-60	32

60-80	p ₂
80-100	19
Total	120

Question 6

Choose correct answer from the following frequency distribution

Class interval	10-20	20-30	30-40	40-50	50-60	60-70
No. of students	5	10	15	20	25	30

- Upper limit for frequency 25.
a.50 b.60 c.55 d.70
- Modal class is:
a. 40-50 b. 60-70 c. 50-60 d. 10-20
- Frequency of modal class is:
a. 25 b. 30 c.40 d.5
- Size of the class interval is:
a.8 b.15 c.10 d.20
- Median class is:
a. 50-60 b. 60-70 c.40-50 d.30-40

Question 7

Find the mean of the following data

Classes	frequency
0.5-5.5	13
5.5-10.5	16
10.5-15.5	22
15.5-20.5	18
20.5-25.5	11

Question 8

The median of the distribution given below is 14.4. find the values of x and y if the total frequency is 20.

Class interval	0-6	6-12	12-18	18-24	24-30
frequency	4	X	5	y	1

Question 9

For the following frequency distribution find the mode.

Class	3-6	6-9	9-12	12-15	15-18	18-21	21-24
Frequency	2	5	10	23	21	12	3

Question 10

Fill the missing numbers in the given frequency distribution.

Class interval	Frequency	Class mark	Cumulative frequency
5-10	4		4
10-15	5	12.5	
15-20	2		11
20-25	12	22.5	

25-30	3		26
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Question 11

Find the frequencies of the distribution when cumulative frequencies are given

Class	Cumulative frequency
10-20	5
20-30	12
30-40	15
40-50	20
50-60	30

Question 12

Find the value of $(x+y)$ for following distribution when sum of all frequencies is 80.

Class	frequency	Cumulative frequency
5-10	10	
10-15	X	
15-20	20	
20-25	Y	
25-30	15	
total	80	

Question 13

Find the missing frequencies in the following distribution, if the sum of frequencies is 120 and the mean is 50.

Class	0-20	20-40	40-60	60-80	80-100
frequency	17	F1	32	F2	19

Question 14

Find the mean of following distribution by assumed mean method

Class interval	frequency
10-20	2
20-30	5
30-40	3
40-50	10
50-60	6

Question 15

Calculate the median from the following data

Marks	0-10	10-20	20-30	30-40	40-50
No. of students	8	16	36	34	6

Question 16

Complete the table 2 using table 1

Table 1

Classes	frequency
10-20	5
20-30	2
30-40	8
40-50	6
50-60	3
60-70	4

Table 2		
Cumulative frequency	Modal class =	Median class =
	Upper limit of modal class=	Cumulative frequency of the class preceding the median class=
	Lower limit of modal class =	frequency of the median class =
	Frequency of modal class =	Class size=

Question 17

The following table gives the literacy rate (in percentage) of 35 cities. Find the mean literacy rate

Literacy rate(in %)	45-55	55-65	65-75	75-85	85-95
Number of cities	3	10	11	8	3

Question 18

Find the class mark, modal class and median class for following data and also find median of data

Class	4-8	8-12	12-16	16-20
frequency	2	11	4	3

Question 19

Find the median of following data.

Height(in cm)	No. Of students
Less than 120	12
Less than 140	26
Less than 160	34
Less than 180	40
Less than 200	50

Question 20

While computing mean of grouped data, we assume that the frequencies are

- Evenly distributed over all the classes.
- Centred at the class marks of the classes.
- Centred at the upper limit of the classes.
- Centred at the lower limit of the classes

ANSWER

Ans. 1

Class	10-20	20-30	30-40	40-50	50-60
Frequency	6	5	8	25	20

- a. 50
- b. 15, 25, 35, 45, 55
- c. 30
- d. 64

Ans. 2

Class interval	15-30	30-45	45-60	60-75	75-90
Frequency	6	18	19	4	11

- a. 45-60
- b. 60
- c. 19
- d. 4
- e. 18

Ans. 3

Here given $\sum F_i = 40$ find the value of x and cumulative frequency is

Class interval	Frequency	Cumulative frequency
10-20	5	5
20-30	8	13
30-40	15	28
40-50	X=2	30
50-60	10	40
	N=40	

Ans. 4 Frequency Distribution is as follow

Marks	X_i	F_i	$D_i = X_i - a$	$F_i D_i$
0-10	5	4	-30	-120
10-20	15	6	-20	-120
20-30	25	8	-10	-80
30-40	35=a	10	0	0
40-50	45	12	10	120
50-60	55	30	20	600
		$\sum F_i = 70$		$\sum F_i D_i = 400$

By formula of assumed mean method;

$$\text{Mean} = a + \frac{\sum F_i D_i}{\sum F_i}$$

$$35 + 400/70$$

$$35 + 5.7 = 40.7$$

Ans. 5 Given $\sum F_i = 120$ and Mean= 50

Class	0-20	20-40	40-60	60-80	80-100	
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Frequency(F_i)	17	P_1	32	P_2	19	$\sum F_i = 68 + p_1 + p_2$
X_i	10	30	50	70	90	
$F_i X_i$	170	$30P_1$	1600	$70P_2$	1710	$\sum F_i X_i = 3480 + 30P_1 + 70P_2$

Here Sum of frequencies is given as 120 so $\sum F_i = 120$

$$68 + P_1 + P_2 = 120$$

$$P_1 + P_2 = 52 \dots\dots\dots (1)$$

Using Mean = $\frac{\sum F_i X_i}{\sum F_i}$

$$(3480 + 30P_1 + 70P_2) / 120 = 50$$

$$3480 + 30P_1 + 70P_2 = 6000$$

$$30P_1 + 70P_2 = 2520 \dots\dots\dots (2)$$

On Solving eq. 1 and 2 we get $P_1 = 28$ and $P_2 = 24$

Ans. 6

Class interval	10-20	20-30	30-40	40-50	50-60	60-70
No. of students	5	10	15	20	25	30

1. Option b
2. Option c
3. Option a
4. Option c
5. Option a

Ans. 7

Classes	X_i	Frequency(F_i)	$F_i X_i$
0.5-5.5	3	13	39
5.5-10.5	8	16	128
10.5-15.5	13	22	286
15.5-20.5	18	18	324
20.5-25.5	23	11	253
		$\sum F_i = 80$	$\sum F_i X_i = 1030$

$$\begin{aligned} \text{We know Mean} &= \frac{\sum F_i X_i}{\sum F_i} \\ &= 1030 / 80 = 12.9 \end{aligned}$$

Ans. 8

Given Median = 14.4, $N = 20$ and we have the value of x and y

Class interval	0-6	6-12	12-18	18-24	24-30
Frequency	4	x	5	y	1
Cf	4	$4+x$	$9+x$	$9+x+y$	$10+x+y$

Since $N = 20$ so $10 + x + y = 20$

$$x + y = 10 \dots\dots\dots (1)$$

We know median = 14.4 so median class is 12-18

So $l=12$, $h= 6$, $cf= 4+x$, $f= 5$

Median = $l+ h \times (N/2 -cf)/f$

$14.4= 12+ 6 \times (10-4-x)/5$ (2)

On solving eq. 2 we get, $x= 4$ and putting value of x in eq. 1 we get $y= 6$

Ans. 9

Class	3-6	6-9	9-12	12-15	15-18	18-21	21-24
Frequency	2	5	10	23	21	12	3

Here modal class is 12-15

$F_0=10$ $f_2=21$ $h=3$ $l=12$, $f_1= 23$

As we know that Mode= $l+ h \times \{(f_1-f_0)/(2f_1-f_0-f_2)\}$

$12+ 3 \times \{(23-10)/46-10-21\}$

$12 + 3 \times 13/15$

$12+ 2.6 = 14.6$

Ans. 10

Class interval	Frequency	Class mark	Cumulative frequency
5-10	4	7.5	4
10-15	5	12.5	9
15-20	2	17.5	11
20-25	12	22.5	23
25-30	3	27.5	26

Ans. 11

Class	Cumulative frequency	Frequency
10-20	5	5(Initial Frequency in cf)
20-30	12	$12-5=7$
30-40	15	$15-12=3$
40-50	20	$20-15=5$
50-60	30	$30-20=10$

Ans. 12

Given $N= 80$, we have to find sum of x and y .

Class	Frequency	Cumulative frequency
5-10	10	10
10-15	X	$10+x$
15-20	20	$30+x$
20-25	Y	$30+x+y$
25-30	15	$45+x+y$
total	80	

We know that sum of frequencies is equal to last term of cumulative frequency

$N= 45+x+y$

$80=45+x+y$

$$X+y=80-45=35$$

Ans. 13

Given $\sum F_i = 120$ and Mean = 50

Class	0-20	20-40	40-60	60-80	80-100	
Frequency(F_i)	17	F_1	32	F_2	19	$\sum F_i = 68 + F_1 + F_2$
X_i	10	30	50	70	90	
$F_i X_i$	170	$30F_1$	1600	$70F_2$	1710	$\sum F_i X_i = 3480 + 30F_1 + 70F_2$

Here Sum of frequencies is given as 120 so $\sum F_i = 120$

$$68 + F_1 + F_2 = 120$$

$$F_1 + F_2 = 52 \dots\dots\dots (1)$$

Using Mean = $\sum F_i X_i / \sum F_i$

$$(3480 + 30F_1 + 70F_2) / 120 = 50$$

$$3480 + 30F_1 + 70F_2 = 6000$$

$$30F_1 + 70F_2 = 2520 \dots\dots\dots (2)$$

On Solving eq. 1 and 2 we get $F_1 = 28$ and $F_2 = 24$

Ans. 14

Class interval	X_i	F_i	$D_i = X_i - a$	$F_i D_i$
10-20	15	2	-20	-40
20-30	25	5	-10	-50
30-40	35 = a	3	0	0
40-50	45	10	10	100
50-60	55	6	20	120
		$\sum F_i = 26$		$\sum F_i D_i = 130$

Using formula of assume mean method

$$\text{Mean} = a + \frac{\sum F_i D_i}{\sum F_i}$$

$$= 35 + \frac{130}{26} = 35 + 5 = 40$$

Ans. 15

Marks	0-10	10-20	20-30	30-40	40-50
No. of students	8	16	36	34	6
Cf	8	24	60	94	100

We have to find the median. Here $N = 100$ and $N/2 = 50$

Median class = 20-30

$l = 20$, $cf = 24$, $f = 36$, $h = 10$

$$\begin{aligned} \text{Median} &= l + h \times \frac{(N/2 - cf)}{f} \\ &= 20 + 10 \times \frac{(50 - 24)}{36} \\ &= 20 + 10 \times \frac{26}{36} \\ &= 20 + 7.2 = 27.2 \end{aligned}$$

Ans. 16

Complete the table no. 2 using table no. 1

Table 1	
Classes	Frequency
10-20	5
20-30	2
30-40	8
40-50	6
50-60	3
60-70	4

Table 2		
Cumulative frequency	Modal class=30-40	Median class= 30-40(Because $N/2=14$, cf greater than 14 is 15 whose class is 30-40)
5	Upper limit of modal class= 40	Cumulative frequency of the class preceding the median class= 7
7	Lower limit of modal class = 30	frequency of the median class = 8
15	Frequency of modal class = 8	Class size= 10
21		
24		
28		

Ans. 17

Literacy rate	X_i	F_i	$F_i X_i$
45-55	50	3	150
55-65	60	10	600
65-75	70	11	770
75-85	80	8	640
85-95	90	3	270
		$\sum F_i=35$	$\sum F_i X_i= 2430$

We know Mean= $\frac{\sum F_i X_i}{\sum F_i}$
 $\frac{2430}{35}= 69.43 \%$

Ans. 18

Class	4-8	8-12	12-16	16-20
frequency	2	11	4	3

Class mark: 6, 10, 14, 18
 Modal Class: 8-12
 Solution to find Median:

Class	4-8	8-12	12-16	16-20
frequency	2	11	4	3
Cf	2	13	17	20

Here $N=20$ so $N/2=10$

Median Class= 8-12

$$l=8, cf= 2, h= 4, f= 11$$

$$\text{Median} = l + h \times (N/2 - cf)/f$$

$$8 + 4 \times (10 - 2)/11$$

$$8 + 2.9 = 10.9$$

Ans. 19

Height	Frequency(F_i)	Cf
100-120	12	12
120-140	14	26
140-160	8	34
160-180	6	40
180-200	10	50
	N=50	

Here $N/2=25$, so median class is 120-140

So $l=120$, $h= 20$, $f= 14$, $cf= 12$

$$\text{We know median} = l + h \times (N/2 - cf)/f$$

$$= 120 + 20 \times (25 - 12)/14$$

$$= 120 + 18.57 = 138.57$$

Ans. 20

Option b. centre at the class marks of the classes.