

Statistics

KEY POINTS

1. The mean of grouped data can be found by:

(i) The direct method:
$$\overline{X} = \frac{\sum f_i x_i}{\sum f_i}$$

(ii) The assumed mean method: $\overline{X} = A + \frac{\sum f_i d_i}{\sum f_i}$

where $d_i = x_i - A$

(iii) The step deviation method:
$$\overline{X} = A + \frac{\sum f_i u_i}{\sum f_i} \times h$$
, where $u_i = \frac{x_i - A}{h}$

2. The mode for grouped data can be found by using the formula:

$$\mathbf{Mode} = l + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$$

where l = lower limit of the modal class.

 f_1 = frequency of modal class.

 f_0 = frequency of the preceding class of the modal class.

- f_2 = frequency of the succeeding class of the modal class.
- h = size of the class interval. (as whing all class size to be equal)

Modal class - class interval with highest frequency.

3. The median for the grouped data can be found by using the formula:

Median =
$$l + \left[\frac{\frac{N}{2} - F}{f}\right] \times h$$

where, *l* = lower limit of the median class.

f = frequency of median class

h = size of the class interval. (assuming all class size to be equal)

N = Number of observations.

F = cumulative frequency of class interval proceeding the median class.

- 4. Empirical Formula: Mode = 3 median -2 mean
- 5. **Cumulative frequency curve or an Ogive:** Ogive is graphical representation of the cumulative frequency distribution.

Steps to draw cumulative frequency curve or an ogive:

Less than method: To draw an ogive by less than method use following steps: **Step1:** Start with upper limits of class intervals and add class frequency to get cumulative frequency distribution.

Step2: Mark upper class limits along X-axis on suitable scale.

Step3: Mark cumulative frequency along Y-axis on suitable scale.

in e	eniou	Jsinfir	nity						
Believe in kn	owledge Step4:	Plot the po	pints (r f)where x	a is upper	limit of a	class and	<i>f</i> is the	
	стор II -	orrespond	ling cumula) tive frequ				$J_i = m c$	
	Sten5:	loin the no	ning cumura pints plotte	d above h	ov free har	nd to get a	n ogive		
	More t	han metho	od: To drav	v an ogive	bv more t	than meth	od use fol	llowing st	eps:
	Step1:	Start with	lower limit	s of the cl	ass interv	als and fro	om the tot	al frequer	ncy subtract
	t	he frequer	ncy of each	class to c	btain the	cumulativ	e frequen	cy distrib	ution.
	Step2:	Mark the l	ower class	limits alo	ng X-axis d	on suitable	e scale.		
	Step3:	Mark cum	ulative frec	quency alo	ong Y-axis	on suitabl	e scale.		
	Step4:	Plot the po	pints (x_{i}, f_{i}))where \mathfrak{x}	c_i is lower	limit of cl	lass and j	f_i is the	
	С	orrespond	ling cumula	ative frequ	uency.				
	Step5:	loin the po	oints plotte	d above b	oy free har	nd to get a	n ogive.		
				<u>Multipl</u>	<u>e Choice</u>	Questio	<u>ns</u>		
1.	If mean	of 4, 6, 8,	10, x, 14, 1	16 is 10 th	en the val	ue of 'x' is	5		
	(a) 11		(b)	12		(c) 13			(d) 9
2.	The me	an of x, x+	1, x+2, x+3	, x+4, x+5	and x+6 i	s			
	(a) x		(b)	x+3		(c) x+	4		(d) 3
3.	If the m	ode of 2, 3	3, 5, 4, 2, 6	, 3, 5, 5, 2	and x is 2	then the	value of 'x	ć is	
	(a) 2		(b)	3		(c) 4			(d) 5
4.	The mo	dal class o	f the follow	ving distri	bution is				
				_					
	Cla	SS	10 - 15	1 5 - 20	20 - 25	25 - 30	30 - 35		
	Int Ero	ervar	in	en	ious	infir	hity-		
	(a) 30 -	- 35	۳ ۱۱ ه.(th)	20 6.25(<u>10-23</u>	(c) 2	5 – 30		(d) 15 – 20
5	(d) 50 A teach	or ask the	students t	o find the	ge average r	narks obta	ained by th	no class st	udents in
5.	Mathei	the studen	t will find		average i				
	(a) means	an	h wiii iiiu (h)	median		(c) m	nde		(d) sum
6		nirical rola	(5) hionshin h	otwoon th	na thraa m		f control t	ondoncy i	(u) 50111
0.	(a) 3 m	$a_{2}n - mor$	lo + 2 mod	ion		(h)	a modian	– mode +	o noon
	(a) 5 m		ie + 2 meu	lall		(0)		- moue +	
	(c) 3 m	ode = mea	an + 2 medi	ian		(d)	median =	3 mode –	2 mean
7.	Class m	ark of the	class 19.5	– 29.5 is					
	(a) 10		(1	o) 49		(c)	24.5		(d) 25
8.	Measur	e of centra	al tendency	y is repres	ented by	the abscis	sa of the p	point whe	re the less
	than og	ive and m	ore than of	give inters	sect is		mada		(d) Nono
	(a) mea	וז ב		(b) media	n	(C)	mode		(d) None
		-							
9.	The me	dian class	of the follo	wing dist	ribution is	;			
Cla	ISS	0 - 10	10 - 20	20 - 20	30 - 10	40 - 50	50 - 60	60 - 70	_
Inter	rval:	0 - 10	10 - 20	20 - 30	50 - 40	JC - 0F	J0 - 00	00 - 70	_
Frequ	ency:	4	4	8	10	12	8	4	-
4. 5. 6. 7. 8. 9. Cla Inter Frequ	(a) 2 The mo Cla Int Fre (a) 30 - A teach Maths t (a) mea (a) 3 m (c) 3 m (c) 3 m (c) 3 m (c) 3 m (c) 3 m (a) 10 Measur than og (a) mea of these The me ass rval: ency:	dal class o ss erval equency - 35 er ask the che studen an pirical relation can = moo ode = meation ark of the re of centrative ive and m n e dian class 0 - 10 4	(b) if the follow 10 - 15 Bel(A) Students t it will find (b) ationship b de + 2 med class 19.5 - (l al tendency ore than og of the follo 10 - 20 4	3 wing distri 15 - 20 20 m25 (cd) o find the median etween the ian - 29.5 is b) 49 y is represent give intersent (b) median powing dist 20 - 30 8	bution is 20 - 25 20 - 25 3e average r he three m sect is n ribution is 30 - 40 10	(c) 4 25 - 30 (c) 2 narks obta (c) m the assures o (b) 3 (d) (c) (c) (c) (c) (c) (c) (c) (c	30 - 35 $5 - 30$ ained by the second seco	 	(d) 5 (d) 15 – 20 udents in (d) sum 2 mean (d) 25 re the less (d) None

					•.		
					Ir	n - enio	Usintinity
	(a) 20 – 30	(b) 40 – 5	50	(c) 30) – 40 ^{Bel}	lieve in knowledge (d) 50	0 – 60
10.	The mean of 20 nu	umbers is 17. if	3 is added to	o each numl	ber. then t	the new mean	is
	(a) 20	(b) 2	1	(c) 2	2	(d) 24	4
11.	The mean of 5 nur	nbers is 18. If o	ne number i	s excluded t	then their	mean is 16, th	en the
	excluded number	is					
	(a) 23	(b) 2	24	(c) 2	.5	(d) 2	6
12.	The mean of first S	5 prime numbei	rs is				
	(a) 5.5	(b)	5.6	(c) 5	5.7	(d) 5	, ,
13.	The sum of deviat	ions of the valu	es 3, 4, 6, 8,	14 from the	eir mean is	5	
	(a) 0	(b)	1	(c) 2	2	(d) 3	3
14.	If median = 15 and	l mean = 16, the	en mode is				
	(a) 10	(b) 11	(c) 2	12	(d) 13	
15.	The mean of 11 of	oservations is 50	0. If the mea	n of first six	observat	ions is 49 and t	hat of
	last six observatio	ns is 52, then th	ie sixth obse	rvation is			
	(a) 56	()	b) 55	(c)	54	(d) 53	
16.	The mean of the f	ollowing distrib	ution is 2.6,	then the va	lue of 'x' i	S	
	Variable	1 2	3	4	5		
	Frequency	4 5	х	1	2		
	(a) 24	(b) 3		(c) 8		(d) 13	
		2/3	/4 Marks (Duestions		()	
1	The mean of 40 of	servations was	160 lt was	detected or	n rechecki	ng that the val	ue of
т.		aniad as 17 fo	r computing	+ho moon	Find the c	orrest mean	
2			ir computing	g the mean.		orrect mean.	20.24
2.	Find 'x' if the med	ian of the obser	Yationenia :	Sending or	der 24, 25	, 26, x+2, x+3,	30, 31,
	34 is 27.5.	Believe in kn	owledge				
3.	Find the value of '	p' if mean of th	e following o	distribution	is 7.5		
	Variable	3 5	7	9	11	13	
		<u> </u>	4 5		0		
	Frequency	6 8	15	р	8	4	
4.	The Arithmetic Me	ean of the follow	wing frequer	ncy distribut	tion is 53.	Find the value	of p.
	Class Interval:	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100	
	Frequency:	12	15	32	a	13	



5. From The cumulative frequency table, write the frequency of the class 20 - 30.

Marks	Number of Students	
Less than 10	1	
Less than 20	14	
Less than 30	36	
Less than 40	59	
Less than 50	60	

The mean of the following frequency distribution is 62.8 an the sum of all frequencies is
 50. Find the values of x and y

Class Interval:	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100	100-120
Frequency:	5	x	10	у	7	8

7. The following frequency distribution gives the daily wages of a worker of a factory. Find mean daily wage of a worker.

Daily Wage (in Rs.)	Number of Workers
More than 300	0
More than 260 NIC	DUSINTINITY
Moßelitham200wledge .	21
More than 150	44
More than 100	53
More than 50	59
More than 0	60

8. The median of the following frequency distribution is 28.5 and sum of all the frequencies is 60. Find the values of x and y.

Class Interval:	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	
Frequency:	5	х	20	15	у	5	
9. Find the i	mean, med	lian and mo	ode of the	following	•		
Class Interval:	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
Froquoncy	6	8	10	15	5	Δ	2



5

		_	Ma	rks	Numł Stud	per of ents				
			Less th	nan 10	1	0				
			Less th	nan 20	1	5				
			Less th	nan 30	3	0				
			Less th	nan 40	5	0				
			Less th	nan 50	7	2				
			Less th	nan 60	8	5				
			Less th	nan 70	9	0				
			Less th	nan 80	9	5				
		_	Less th	nan 90	10	00				
11. Draw	'less tha	an' and 'm	ore tha	n' ogives fo	or the fol	lowing	distribu	tion		
Marks:	0-10	10- 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	0 70 - 80	80 - 90	90-
No. of	5	6	8	10	15	9	8	7	7	I
		r	1-							
Also find r 12. The m frequ	node of encies is	the follow $50.$	ing dist	ribution is CONC	65. Find t	the valu	ies of x	and y, if su	m of	<u> </u>
Also find r 12. The m frequ Class In Freque	node of encies is terval: ency:	the follows 50. $0 - 20^{Bi}$	ring dist efieve in 20 - 2	ribution is CONC Enowledge 40 40 - 61 x	65. Find t USI 0 60 - 8 12	the valu 30 80	-100 6	and y, if su <u>100- 20</u> Y	m of 120 -140 3)
Also find r 12. The m frequ Class In Freque	node of encies is terval: ency:	the follow 550.	ring dist efieve in 20-2 8	ribution is CONC for the second secon	65. Find t USI <u>0 60 - 8</u> 12	the valu	-100 6	and y, if su 100- 20 y	m of <u>120 -140</u> <u>3</u>)
Also find r 12. The m frequ Class In Freque	node of encies is terval: ency:	the follow 550. $0 - 20^{\mathcal{B}^{2}}$ 6	ring dist nefieve in 20 - 2 8	ribution is CONC 40 40 - 61 x Ans Multiple Cl	65. Find t USI <u>0 60 - 8</u> 12 wers	the valu 80 80	-100 6	and y, if su <u>100- 20</u> Y	m of <u>120 -140</u> <u>3</u>)
Also find r 12. The m frequ Class In Freque	terval:	the follow 550.	ring dist effieve in 1 20 - 2 8	ribution is CONC 40 40 - 61 x <u>Ans</u> <u>Ans</u> <u>Aultiple Cl</u> 3. (a)	65. Find t USI <u>0 60 - 8</u> 12 wers noice Que	the valu 80 80	-100 6	and y, if su <u>100- 20</u> <u>y</u>	m of <u>120 -140</u> <u>3</u>)
Also find r 12. The m frequ Class In Freque	terval: encies is terval: ency:	the follow 5 50.	ring dist elieve in 1 20 - 2 8	ribution is CONC 40 40 - 61 x <u>Ans</u> <u>Ans</u> <u>Multiple Cl</u> 3. (a)	65. Find t USI <u>0 60 - 8</u> 12 wers noice Que 4. (the valu 30 80 estions (b)	100 6 5. (and y, if su <u>100- 20</u> y	m of <u>120 -140</u> <u>3</u> 6. (b))
Also find r 12. The m frequ Class In Freque 1.	(b)	the follow 5 50. 0 - 20 6 2. (b) 7. (c) 9. (c)	ring dist effeve in 1 20 - 2 8	ribution is CONC 40 40 - 61 x <u>Ans</u> <u>Ans</u> 3. (a) 10. (a)	65. Find t USI <u>0 60 - 8</u> 12 wers noice Que 4. (the valu 80 80 estions (b)	-100 6 5. (and y, if su <u>100- 20</u> y (b)	m of <u>120 -140</u> 3 6. (b) 13. (a))
Also find r 12. The m frequ Class In Freque 1. 8. 14	(b) (b) (c) (b)	the follow 550. $0 - 20^{36}$ 6 2. (b) 7. (c) 9. (c) 16. (c)	ring dist effeve in 1 20 - 2 8	ribution is CONC 40 40 - 61 x <u>Ans</u> <u>Ans</u> 3. (a) 10. (a)	65. Find t USI <u>0 60 - 8</u> 12 wers noice Que 4. (the valu 30 80 (b) . (d)	100 6 5. (and y, if su <u>100- 20</u> y (a)	m of <u>120 -140</u> 3 6. (b) 13. (a))
Also find r 12. The m frequ Class In Freque 1. 8. 14 15	(b) (b) (b) (b) (b)	the follow 5 50. 0 - 20 6 2. (b) 7. (c) 9. (c) 16. (c	ning dist effieve in 1 20 - 2 8	ribution is CONC ribution is CONC ribution is ribution is ributi	65. Find t USI <u>0 60 - 8</u> 12 wers noice Que 4. (11.	estions (b)	100 6 5. (12.	and y, if su <u>100- 20</u> y (b)	m of <u>120 -140</u> 3 6. (b) 13. (a))
Also find r 12. The m frequ Class In Freque 1. 8. 14 15	(b) (b) (b) (c) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c	the follow 550. $0 - 20^{36}$ 6 2. (b) 7. (c) 9. (c) 16. (c) 2. x -	ing dist effece in 1 20 - 2 8	ribution is CONC <u>Anse</u> <u>Anse</u> <u>Anse</u> <u>Anse</u> <u>Anse</u> <u>Anse</u> <u>10. (a)</u> <u>2/3/4 Mase</u> <u>3. n = 3</u>	$\frac{65. \text{ Find t}}{0}$ $\frac{12}{12}$ $\frac{\text{wers}}{12}$ $\frac{11.}{11.}$ $\frac{\text{rks Ques}}{4.}$	estions (b) . (d)	100 6 5. (12.	and y, if su <u>100- 20</u> y (a) (b)	m of <u>120 -140</u> 3 6. (b) 13. (a))
Also find r 12. The m frequ Class In Freque 1. 8. 14 15 1.	(b) (b) (b) (c) (b) (b) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c	the follow 5 50. 0 - 20 6 2. (b) 7. (c) 9. (c) 16. (c 2. x = 12 7 Rs	(ing dist <u>effieve in 1</u> <u>20 - 2</u> <u>8</u> <u>182 50</u>	ribution is Control (1) Control (1) Contr	65. Find t 0 60 - 8 12 wers noice Que 4. (11. rks Ques 4. 2 = 7	estions (b) . (d)	-100 6 5. (12.	and y, if su <u>100- 20</u> y (a) (b)	m of <u>120 -140</u> <u>3</u> 6. (b) 13. (a))
Also find r 12. The m frequ Class In Freque 1. 8. 14 15 1. 9	(b) (b) (b) (c) (b) (c) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c	the follow 5 50. 0 - 20 6 2. (b) 7. (c) 9. (c) 16. (c) 2. x = 12 7. Rs. 30. media	ing dist effece in 20 - 2 8 <u>20 - 2</u> 8	ribution is CONC <u>Anse</u> <u>Anse</u> <u>Anse</u> <u>Anse</u> <u>Anse</u> <u>Anse</u> <u>Anse</u> <u>a</u> <u>a</u> <u>a</u> <u>a</u> <u>a</u> <u>a</u> <u>a</u> <u>a</u>	65. Find t 0 60 - 8 12 wers noice Que 4. (11. rks Ques 4. 2 = 7 33.33	estions (b) . (d)	100 -100 6 5. (12. 5. 2 10	and y, if su <u>100- 20</u> y (a) (b) 22 41.82	m of <u>120 -140</u> 3 6. (b) 13. (a))
Also find r 12. The m freque Class In Freque 1. 8. 14 15 1. 6. 9. 11	(b) (b) (b) (b) (d) (d) (a) (a) (b) (b) (b) (b) (b) (b) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c	the follow 550. $0 - 20^{36}$ 6 2. (b) 7. (c) 9. (c) 16. (c) 2. x = 12. x = 12. x =	(ing dist effeve in 1 20 - 2 8 20 - 2 8	ribution is Control (1) Control (1) Contr	65. Find t 0 60 - 8 12 wers noice Que 4. (11. rks Ques 4. 2 = 7 33.33	the valu <u>80 80</u> (b) . (d) <u>stions</u> 28	100 -100 6 5. (12. 5. 2 10.	and y, if su <u>100- 20</u> y (a) (b) 22 41.82	m of <u>120 -140</u> <u>3</u> 6. (b) 13. (a))

10. The following frequency distribution shows the marks obtained by 100 students in a school. Find mode.



