

4/10/2020

ch-15
exercise 15.5

Q. 1(i)

x	f
3	4
4	2
5	5
6	2
7	2
8	1
9	2

$\therefore$ Mode = 5

(ii)

x	f
3	5
4	2
5	4
6	2
7	2
8	1
9	2

$\therefore$ Mode = 3

(iii)

x	f
8	1
15	4
18	1
19	1
20	1
24	2
25	1
26	1

$\therefore$ Mode = 15

Q.2

Shirt size	No. of persons
37	15
38	25
39	39
40	41
41	36
42	17
43	15
44	12

$$\therefore \text{Mode} = \boxed{40}$$

Q.3 (i)

class	f
0-10	5
10-20	8
20-30	7
30-40	12
40-50	28
50-60	20
60-70	10
70-80	10

Modal class = 40-50

$$\text{Mode} = l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$$

$$= 40 + \frac{28 - 12}{56 - 12 - 20} \times 10$$

$$= 40 + \frac{16 \times 4}{24} = 40 + 2.67$$

$$= 40 + \frac{20}{3} = 40 + 6.67$$

$$= \boxed{46.67}$$

(ii)

class	f
10-15	30
15-20	45
20-25	75
25-30	35
30-35	25
35-40	15

Modal class = 20-25

$$\text{Mode} = l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$$

$$= 20 + \frac{75 - 45}{150 - 45 - 35} \times 5$$

$$= 20 + \frac{30}{70} \times 5$$

$$= 20 + \frac{15}{7} = 20 + 2.14$$

$$= \boxed{22.14}$$

(ii)

Class	f
25-30	25
30-35	34
35-40	50
40-45	42
45-50	38
50-60	14

Modal class = 35-40

$$\begin{aligned}
 \text{Mode} &= l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h \\
 &= 35 + \frac{50 - 34}{100 - 34 - 42} \times 5 \\
 &= 35 + \frac{16 \times 5}{24} = 35 + \frac{10}{3} \\
 &= 35 + 3.33 = \boxed{38.33}
 \end{aligned}$$

Q.4 (i) Group A

Age	f
16-18	50
18-20	78
20-22	46
22-24	28
24-26	23

Modal class = 18-20

$$\begin{aligned}
 \text{Mode} &= l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h \\
 &= 18 + \frac{78 - 50}{156 - 50 - 46} \times 2 \\
 &= 18 + \frac{28 \times 2}{60} = 18 + \frac{14}{5} \\
 &= 18 + 0.93 = \boxed{18.93}
 \end{aligned}$$

(ii) Group B

Age	f
16-18	54
18-20	89
20-22	40
22-24	25
24-26	17

Modal class = 18-20

$$\begin{aligned}
 \text{Mode} &= l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h \\
 &= 18 + \frac{89 - 54}{178 - 54 - 40} \times 2 \\
 &= 18 + \frac{35 \times 2}{84} = 18 + \frac{5}{6} \\
 &= 18 + 0.83 = \boxed{18.83}
 \end{aligned}$$

5/10/2020

classmate

Date

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Ch-15

Exercise 15.5

Q.5

Marks	f
0-10	3
10-20	5
20-30	16
30-40	12
40-50	13
50-60	20
60-70	5
70-80	4
80-90	1
90-100	1

Modal class = 50-60

$$\text{Mode} = l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$$

$$= 50 + \frac{20 - 13}{40 - 13 - 5} \times 10$$

$$= 50 + \frac{7}{22} \times 10$$

$$= 50 + \frac{35}{11} = 50 + 3.18$$

$$= \boxed{53.18}$$

Q.6

Height (in cm)	Exclusive	f
160-162	159.5 - 162.5	150
163-165	162.5 - 165.5	118
166-168	165.5 - 168.5	142
169-171	168.5 - 171.5	127
172-174	171.5 - 174.5	18

Modal class = 165.5 - 168.5

Mode = $l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$

$$= 165.5 + \frac{142 - 118}{284 - 118 - 127} \times 3$$

$$= 165.5 + \frac{24}{39} \times 3 = 165.5 + 1.8$$

$$= \boxed{167.3}$$

Q.11

Classes	x	f	cf	$d_i = x_i - a$	$f_i d_i$
0-50	25	2	2	-150	-300
50-100	75	3	5	-100	-300
100-150	125	5	10	-50	-250
150-200	175 = a	6	16	0	0
200-250	225	5	21	50	250
250-300	275	3	24	100	300
300-350	325	1	25	150	150
		$\Sigma f = 25$			$\Sigma f_i d_i = -150$

(i) Mean = $a + \frac{\Sigma f_i d_i}{\Sigma f_i} = 175 + \frac{(-150)}{25} = 175 - 6 = \boxed{169}$

(ii) $\frac{n}{2} = \frac{25}{2} = 12.5$, Median class =

$$\text{Median} = l + \left[\frac{\frac{n}{2} - cf}{f} \right] \times h = 150 + \frac{12.5 - 10}{6} \times 50$$

$$= 150 + \frac{12.5}{6} = 150 + 20.83 = \boxed{170.83}$$

(iii) Modal class = 150-200

$$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h \right) = 150 + \left(\frac{6 - 5}{12 - 5 - 5} \times 50 \right)$$

$$= 150 + \frac{50}{2} = 150 + 25 = \boxed{175}$$

Q.13

Class	x	f_i	cf	$d_i = x_i - a$	$f_i d_i$
65-85	75	4	4	-60	-240
85-105	95	5	9	-40	-200
105-125	115	13	22	-20	-260

125-145	135 = a	20	42	0	0
145-165	155	14	56	20	280
165-185	175	8	64	40	320
185-205	195	4	68	60	240
		$\sum f_i = 68$			$\sum f_i d_i = 140$

$$(i) \text{ Mean} = a + \frac{\sum f_i d_i}{\sum f_i} = 135 + \frac{140}{68}$$

$$= 135 + 2.05 = \boxed{137.05}$$

$$(ii) \text{ Median} = L + \left[\frac{\frac{n}{2} - cf}{f} \right] \times h$$

$$= 125 + \left[\frac{34 - 22}{20} \right] \times 20 = 125 + 12$$

$$= \boxed{137}$$

$$(iii) \text{ Mode} = L + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times a$$

$$= 125 + \left(\frac{20 - 13}{40 - 14 - 13} \right) \times 20$$

$$= 125 + \frac{140}{13} = 125 + 10.76$$

$$= \boxed{135.76}$$

Q.15

Class	x_i	f_i	cf	$d_i = x_i - a$	$f_i d_i$
0-20	10	6	6	-60	-360
20-40	30	8	14	-40	-320
40-60	50	10	24	-20	-200
60-80	70	12	36	0	0
80-100	90	6	42	20	120

100-120	110	5	47	40	200
120-140	130	3	50	60	180
		$\Sigma f_i = 50$			$\Sigma f_i d_i = -380$

$$(i) \text{ Mean} = a + \frac{\Sigma f_i d_i}{\Sigma f_i} = 70 + \frac{(-380)}{50}$$

$$= 70 - 7.6 = \boxed{62.4}$$

$$(ii) \text{ Median} = l + \left[\frac{\frac{n}{2} - cf}{f} \right] \times h$$

$$= 60 + \left(\frac{25 - 24}{3} \times 20 \right)$$

$$= 60 + \frac{5}{3} = 60 + 1.67 = \boxed{61.67}$$

$$(iii) \text{ Mode} = l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$$

$$= 60 + \left(\frac{24 - 10}{24 - 10 - 6} \times 20 \right)$$

$$= 60 + \frac{21}{8} \times 20 = 60 + 5 = \boxed{65}$$

Q. 18

Area	f
1-3	20
3-5	45
5-7	80
7-9	55
9-11	40
11-13	12

Modal class = 5-7

$$\text{Mode} = l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$$

$$= 5 + \left(\frac{80 - 45}{160 - 45 - 55} \times 2 \right)$$

$$= 5 + \frac{35}{60} \times 2 = 5 + \frac{35}{30}$$

$$= 5 + 1.2 = \boxed{6.2}$$

Q.19

Income

f

Modal class = 10000 - 15000

0 - 5000

8

$$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$$

5000 - 10000

26

$$= 10000 + \left(\frac{41 - 26}{82 - 26 - 16} \times 5000 \right)$$

10000 - 15000

41

15000 - 20000

16

$$= 10000 + \left(\frac{15}{40} \times 5000 \right)$$

20000 - 25000

3

25000 - 30000

3

30000 - 35000

2

$$= 10000 + 1875$$

35000 - 40000

1

$$= \boxed{\text{₹ } 11875}$$