

3/09/2020

classmate

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Ch-15
Statistics
Exercise 15.1

Q.1

x_i	f_i	fix_i
5	4	20
6	8	48
7	14	98
8	11	88
9	3	27
$\Sigma f_i = 40$		$\Sigma fix_i = 281$

$$\text{Mean} = \frac{\Sigma fix_i}{\Sigma f_i} = \frac{281}{40} = 7.025 = \boxed{7.025}$$

Q.2

x_i	f_i	fix_i
19	13	247
21	15	315
23	16	368
25	18	450
27	16	432
29	15	435
31	13	403
$\Sigma f_i = 106$		$\Sigma fix_i = 2650$

$$\text{Mean} = \frac{\Sigma fix_i}{\Sigma f_i} = \frac{2650}{106} = 25 = \boxed{25}$$

Q.3

x_i	f_i	fix_i
10	3	30
15	10	150

p	25	$25p$
25	7	175
35	5	175
	$\Sigma f_i = 50$	$\Sigma f_i x_i = 530 + 25p$

$$\text{Mean} = \frac{\Sigma f_i x_i}{\Sigma f_i}$$

$$20.6 = \frac{530 + 25p}{50}$$

$$20.6 \times 50 = 530 + 25p$$

$$1030 - 530 = 25p$$

$$p = \frac{500}{25} = 20$$

$$\boxed{p = 20}$$

Q.4

x_i	f_i	$f_i x_i$
5	6	30
10	p	$10p$
15	6	90
20	10	200
25	5	125
	$\Sigma f_i = 27 + p$	$\Sigma f_i x_i = 445 + 10p$

$$\text{Mean} = \frac{\Sigma f_i x_i}{\Sigma f_i}$$

$$15 = \frac{445 + 10p}{27 + p}$$

$$15(27 + p) = 445 + 10p$$

$$15p - 10p = 445 - 405$$

$$5p = 40$$

$$\boxed{p = 8}$$

Q.5

x_i	f_i	fix_i
8	12	96
12	16	192
15	20	300
β	24	24β
20	16	320
25	8	200
30	4	120
$\Sigma f_i = 100$		$\Sigma fix_i = 1228 + 24\beta$

$$\text{Mean} = \frac{\Sigma fix_i}{\Sigma f_i}$$

$$16.6 = \frac{1228 + 24\beta}{100}$$

$$1660 = 1228 + 24\beta$$

$$1660 - 1228 = 24\beta$$

$$\beta = \frac{432}{24} = 18$$

$$\boxed{\beta = 18}$$

Q.6

x_i	f_i	fix_i
5	2	10
8	5	40
10	8	80
12	22	264
β	7	7β
20	4	80
25	2	50
$\Sigma f_i = 50$		$\Sigma fix_i = 524 + 7\beta$

$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i}$$

$$12.58 = \frac{524 + 7p}{50}$$

$$50 \times 12.58 = 524 + 7p$$

$$629 - 524 = 7p$$

$$p = \frac{105}{7} = 15$$

$$\boxed{p = 15}$$

Q.7

x_i	f_i	$f_i x_i$
3	6	18
5	8	40
7	15	105
9	p	$9p$
11	8	88
13	4	52
$\sum f_i = 41 + p$		$\sum f_i x_i = 303 + 9p$

$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i}$$

$$7.68 = \frac{303 + 9p}{41 + p}$$

$$314.88 + 7.68p = 303 + 9p$$

$$314.88 - 303 = 9p - 7.68p$$

$$11.88 = 1.32p$$

$$p = \frac{11.88}{1.32}$$

$$p = \frac{1188}{132} = 9$$

$$\boxed{p = 9}$$

Q.8

x_i	f_i	fix_i
15	3	45
16	8	128
17	10	170
18	10	180
19	5	95
20	4	80
$\Sigma f_i = 40$		$\Sigma fix_i = 698$

$$\text{Mean} = \frac{\Sigma fix_i}{\Sigma f_i} = \frac{698}{40} = 17.45$$

$$= \boxed{17.45 \text{ years}}$$

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Exercise 15.1

Q.9 Let the no. of candidates from school III be p
Mean = 66

School	f_i	x_i	$f_i x_i$
I	60	75	4500
II	48	80	3840
III	p	55	$55p$
IV	40	50	2000
	$\Sigma f_i = 148 + p$		$\Sigma f_i x_i = 10340 + 55p$

$$\text{Mean} = \frac{\Sigma f_i x_i}{\Sigma f_i}$$

$$66 = \frac{10340 + 55p}{148 + p}$$

$$9768 + 66p = 10340 + 55p$$

$$66 - 55p = 10340 - 9768$$

$$11p = 572$$

$$p = \frac{572}{11}$$

$$p = 52$$

Q.10

x_i	f_i	$f_i x_i$
0	38	0
1	144	144
2	342	684
3	287	861
4	164	656
5	25	125
	$\Sigma f_i = 1000$	$\Sigma f_i x_i = 2470$

$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i}$$

$$= \frac{2470}{1000} = \boxed{2.47}$$

Q.11 Mean = 14

x_i	f_i	$f_i x_i$
5	7	35
10	k	10k
15	8	120
20	4	80
25	5	125
	$\sum f_i = 24+k$	$\sum f_i x_i = 360 + 10k$

$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i}$$

$$14 = \frac{360 + 10k}{24+k}$$

$$336 + 14k = 360 + 10k$$

$$14k - 10k = 360 - 336$$

$$4k = 24$$

$$k = \frac{24}{4}$$

$$\boxed{k = 6}$$

Q.12 Mean = 25

x_i	f_i	$f_i x_i$
5	3	15
15	k	15k

25	3	75
35	6	210
45	2	90
$\Sigma f_i = 14 + k$		$\Sigma f_i x_i = 390 + 15k$

$$\text{Mean} = \frac{\Sigma f_i x_i}{\Sigma f_i}$$

$$25 = \frac{390 + 15k}{14 + k}$$

$$350 + 25k = 390 + 15k$$

$$25k - 15k = 390 - 350$$

$$10k = 40$$

$$k = \frac{40}{10}$$

$$\boxed{k = 4}$$

Q.13 Mean = 18.75

x_i	f_i	$f_i x_i$
10	5	50
15	10	150
β	7	7β
25	8	200
30	2	60
$\Sigma f_i = 32$		$\Sigma f_i x_i = 460 + 7\beta$

$$\text{Mean} = \frac{\Sigma f_i x_i}{\Sigma f_i}$$

$$18.75 = \frac{460 + 7\beta}{32}$$

$$600 = 460 + 7\beta$$

$$7p = 600 - 460$$

$$7p = 140$$

$$p = \frac{140}{7} = 20$$

$$\boxed{p = 20}$$

Q.14 Mean = 20

x_i	f_i	fix_i
15	2	30
17	3	51
19	4	76
$20 + p$	$5p$	$100p + 5p^2$
23	6	138
	$\Sigma f_i = 15 + 5p$	$\Sigma fix_i = 295 + 100p + 5p^2$

$$\text{Mean} = \frac{\Sigma fix_i}{\Sigma f_i}$$

$$20 = \frac{295 + 100p + 5p^2}{15 + 5p}$$

$$300 + 100p = 295 + 100p + 5p^2$$

$$300 - 295 = 5p^2$$

$$5p^2 = 5$$

$$p = \sqrt{1}$$

$$p = +1, -1$$

As, $p = -1$ (not possible)

$$\therefore \boxed{p = 1}$$

Q.15 Mean = 50

x_i	f_i	fix_i
10	17	170
30	f_1	$30f_1$
50	32	1600
70	f_2	$70f_2$
90	19	1710
$\sum f_i = 68 + f_1 + f_2 = 120$		$\sum fix_i = 3480 + 30f_1 + 70f_2$

$$68 + f_1 + f_2 = 120$$

$$f_1 + f_2 = 120 - 68$$

$$f_2 = 52 - f_1 \quad \text{--- (1)}$$

$$\text{Mean} = \frac{\sum fix_i}{\sum f_i}$$

$$50 = \frac{3480 + 30f_1 + 70f_2}{120}$$

$$6000 = 3480 + 30f_1 + 70(52 - f_1)$$

$$6000 - 3480 = 30f_1 + 3640 - 70f_2$$

$$2520 = 30f_1 + 3640 - 70f_2$$

$$252 = 3f_1 + 364 - 7f_2$$

$$-4f_1 = 252 - 364$$

$$f_1 = \frac{-112}{-4}$$

$$\boxed{f_1 = 28}$$

$$f_2 = 52 - f_1$$

$$f_2 = 52 - 28$$

$$\boxed{f_2 = 24}$$