

*** Here we observe that 38.2 $\rightarrow$ fractional value
 therefore $A = \text{Assum. mean} = 35$ is chosen and
 Hence raw moments are obtained from table

$$1) \bar{X} = \frac{A + h \frac{\sum f_i u_i}{\sum f_i}}{100} = \frac{35 + 10 \times \frac{-18}{100}}{100}$$

$$2) u_0' = 1$$

$$3) u_1' = \frac{h \times \sum f_i u_i}{\sum f_i} = \boxed{-1.8}$$

$$4) u_2' = \frac{h^2 \cdot \sum f_i u_i^2}{\sum f_i} = \frac{100 \times 240}{100} = 240$$

$$5) u_3' = \frac{h^3 \sum f_i u_i^3}{\sum f_i} = -1020$$

$$6) u_4' = \frac{h^4 \sum f_i u_i^4}{\sum f_i} = 100 \times 1440 = 144000$$

$$\rightarrow \begin{cases} u_0 = 1 \\ u_1 = 0 \end{cases} \quad \begin{aligned} u_2 &= u_2' - (u_1')^2 \\ &= 240 - (-1.8)^2 \\ &= \boxed{236.76} \end{aligned}$$

$$\begin{aligned} u_3 &= u_3' - 3u_2' u_1' + 2(u_1')^3 \\ &= -1020 + 1296 + -11.664 \\ &= \boxed{264.336} \end{aligned}$$

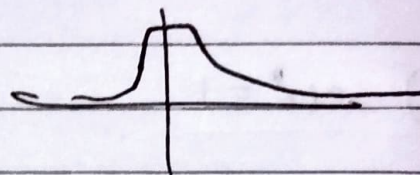
$$\begin{aligned} u_4 &= u_4' - 4u_3' u_1' + 6u_2' (u_1')^2 - 3(u_1')^4 \\ &= 144000 - 7344 + 4665.6 - 31.4928 \\ &= \boxed{141290.11} \end{aligned}$$

$$\beta_1 = \frac{69873.520}{13721652.26} = \boxed{0.0051}$$

$\rightarrow$ Not perfectly symm

$$\beta_2 = \frac{\mu_4}{56055.2976} < 3 \text{ platykurtic}$$

$$= \boxed{2.521}$$



$$\rightarrow \mu_2 = \sigma^2 = \text{Variance} = 236.76$$

$$\rightarrow \text{SD} : \boxed{15.39}$$

$$\begin{aligned} \rightarrow \bar{x} &= \mu_1 + A = \\ &= -1.8 + 35 = \boxed{33.2} \end{aligned}$$

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the cal directly
 CM from the table
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• if a is AM then find out
 raw moments directly from
 the table.

Ques) for the following distribution, find 4
 moments about mean.

2) comment on skewness and kurtosis

3) AM

4) variance and SD.

X	F	$d/f_u = x - A/h $	$f_i u_i$	$f_i u_i^2$	$f_i u_i^3$	$f_i u_i^4$
2	5	-3	-3	15	-135	405
2.5	38	-2	-2	76	-304	608
3	65	-1	-1	65	-65	65
3.5	92	0	0	0	0	0
4	70	1	1	70	70	70
4.5	40	2	2	80	320	640
5	10	3	3	90	270	810
due	320		24	582	156	259

Mid value $\rightarrow$ h value is not one

$\hookrightarrow h = 0.5$

1) $\bar{X} = A + h \frac{\sum f_i u_i}{\sum f_i}$

$= 3.5 + 0.5 \times \frac{24}{320}$

$= 3.5 + 0.0375$

$= 3.5375$

$u_1' = 1$

$u_1' = h \times \frac{\sum f_i u_i}{\sum f_i}$

$= 0.5 \times \frac{24}{320}$

$= 0.0375$

$u_2' = h^2 \frac{\sum f_i u_i^2}{\sum f_i}$

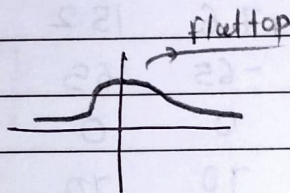
$= 0.5 \times 0.5 \times \frac{582}{320}$

$= 0.4547$

$$e_3' = \frac{h^3 \sum f_i u_i^3}{\sum f_i} = \frac{0.125 \times 0.4875}{\sum f_i} = \boxed{0.061}$$

$$e_4' = \frac{h^4 \sum f_i u_i^4}{\sum f_i} = \frac{0.0625 \times 4}{\sum f_i} = \boxed{0.05074}$$

2) Sk. and kur.



$$\beta_1 = \frac{e_3^2}{e_2^3}$$

$$= \boxed{0.001} > 0$$

not perfectly

Sym. not +vely sk.

$$\beta_2 = \frac{e_4}{e_2^2} = \frac{0.502}{(0.00986)^2}$$

$$\beta_2 = 2.44 < 3$$

↳ platy kurtic.

$$e_1 = 1$$

$$e_1 = 0$$

$$e_2 = e_3' - 3e_2'e_1' + 2(e_1')^3 =$$

$$e_4 = e_4' - 4e_3'e_1' + 6e_2'(e_1')^2 - 3(e_1')^4 =$$

$$e_2 = e_2' - (e_1')^2 =$$

$$= 0.4547 - (0.0375)$$

$$= \boxed{0.453}$$

$$e_3 = 0.061 - 0.051 + 0.000105$$

$$= \boxed{0.010105}$$

$$\underline{0.00986}$$



$$e_4 = 0.0574 - 0.00915 + 0.003836$$

$$= 0.000059326$$

=

$$0.0520$$

$$\boxed{0.502}$$

3) Variance $\rightarrow$

$$\mu_2' = \sigma^2 = \boxed{0.453}$$

$$S.D = \sqrt{\mu_2} = \boxed{0.6730}$$

$$\bar{x} = 3.5375$$

$\rightarrow$ if asked in ques.
always use:

$$\mu_1' = \bar{x} - A$$

$$3.5 + 0.0375 = \bar{x}$$

$$\boxed{3.5375 = \bar{x}}$$

Que) Find 1st 4 moments about working mean 44.5 of a distribution $\gamma - 0.4, 2.99, -0.08, 27.63$ calculate moments about mean
Comment on β_1 and β_2 .
1) find out Vari, S.D, $\bar{x}$.

$\rightarrow$ working mean $\rightarrow$ A value is provided.

i.e

$$\boxed{A = 44.5}$$

$$\mu_1' = -0.4$$

$$\mu_0 = 1 \quad \mu_1 = 0$$

$$\mu_2' = 2.99$$

$$\mu_2 = 2.83$$

$$\mu_3' = -0.08$$

$$\mu_3 = -0.08 + 3.588 + -0.128$$

$$\mu_4' = 27.63$$

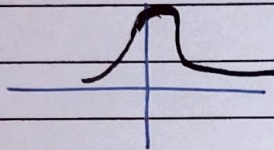
$$= \boxed{3.38}$$

$$\mu_4 = 27.63 - 0.128 + 82.8704$$

$$= \boxed{30.2956} - 0.0768$$

$$\beta_1 = \frac{11.4244}{22.66} = \boxed{0.5041}$$

$$\beta_2 = \frac{30.2956}{6.7354} = \boxed{4.4979}$$



Que) 1st 3 moments about value 2 of a distrib. are 1, 16, -40
find mean, SD, β_1 of distribution.

Que) Calculate 4 mom. about mean and β_1 & β_2

X =	0	1	2	3	4	5	6	7	8
f =	1	8	28	56	70	56	28	8	1

$$\beta_1 = 0$$

$$\beta_2 = 2.75$$

Que) find β_1 and β_2 for the following data

X =	0-10	10-20	20-30	30-40	40-50
f	6	26	47	15	6

$$\beta_1 = 0.0521$$

$$\beta_2 = 3.0437$$