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①

Q:1 (A)

For men:

Consumption of fresh vegetables

Mean = $\frac{\text{Sum of all observation}}{\text{Total number of observation}}$

putting the values

$$\bar{x} = \frac{204 + 289 + 266 + 317}{4}$$

$$\bar{x} = \frac{1046}{4}$$

$$\bar{x} = \boxed{62.5}$$

⇒ Mean of rice:

$$\bar{x} = \frac{367 + 337 + 269 + 246}{4}$$

$$\bar{x} = \frac{1219}{4} = \boxed{304.75}$$

⇒ Mean of fruit:-

$$\bar{x} = \frac{31 + 45 + 69 + 105}{4}$$

$$\bar{x} = \frac{250}{4} = \boxed{62.5}$$

Mean of fish:

$$\bar{x} = \frac{23 + 28 + 31 + 44}{4}$$

$$\bar{x} = \frac{126}{4} = \boxed{31.5}$$

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⇒ Mean of Meat

$$\bar{x} = \frac{70 + 61 + 69 + 77}{4}$$

$$\bar{x} = \frac{277}{4} = \boxed{69.25}$$

⇒ For women:

Mean of fresh vegetables

$$\bar{x} = \frac{178 + 235 + 266 + 304}{4}$$

$$\bar{x} = \frac{983}{4} = \boxed{245.75}$$

⇒ Mean of fruit:

$$\bar{x} = \frac{28 + 41 + 70 + 21}{4}$$

$$\bar{x} = \frac{265}{4} = \boxed{66.25}$$

⇒ Mean of rice

$$\bar{x} = \frac{315 + 276 + 243 + 220}{4}$$

$$\bar{x} = \frac{1054}{4} = \boxed{263.5}$$

⇒ Mean of fruit:

$$\bar{x} = \frac{48 + 43 + 54 + 63}{4}$$

$$\bar{x} = \frac{208}{4} = \boxed{52}$$

③

⇒ Mean of fish:

$$\bar{x} = \frac{19 + 21 + 28 + 46}{4}$$

$$\bar{x} = \frac{114}{4} = \boxed{28.5}$$

⇒ Combined mean for men
* C.M of fresh vegetables

$$\bar{x} = \frac{\bar{x}_1 n_1 + \bar{x}_2 n_2 + \bar{x}_3 n_3 + \dots + \bar{x}_n n_n}{n_1 + n_2 + n_3 + \dots + n_n}$$

$$\bar{x} = \frac{[(236.5)(204) + (236.5)(259) + (236.5)(266) + (236.5)(217)]}{204 + 259 + 266 + 217}$$

$$\bar{x} = \frac{223729}{946} = \boxed{236.5}$$

⇒ Combine mean of rice for men

$$\bar{x} = \frac{[(367)(304.75) + (337)(304.75) + (269)(304.75) + (246)(304.75)]}{367 + 337 + 269 + 246}$$

$$\bar{x} = \frac{371490.25}{1219}$$

$$= \boxed{304.75}$$

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⇒ Combine mean of fish:

$$\bar{x} = \frac{(23)(31.5) + (28)(31.5) + (31)(31.5) + (44)(31.5)}{23 + 28 + 31 + 44}$$

$$23 + 28 + 31 + 44$$

$$\bar{x} = \frac{396.9}{4} = \boxed{3.15}$$

⇒ C.M of Meat for men:

$$\bar{x} = \frac{(70)(69.25) + (61)(69.75) + (69)(69.25) + (77)(69.25)}{70 + 61 + 69 + 77}$$

$$70 + 61 + 69 + 77$$

$$\bar{x} = \frac{19182.25}{277} = \boxed{69.25}$$

⇒ Combine mean for women:
C.M of fresh vegetable

$$\bar{x} = \frac{(245.75)(178) + (245.75)(235) + (245.75)(266) + (245.75)(304)}{178 + 235 + 266 + 304}$$

$$178 + 235 + 266 + 304$$

$$\bar{x} = \frac{241572.25}{983}$$

$$983$$

$$\bar{x} = \boxed{245.75}$$

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Combine mean of meal:

$$\bar{x} = \frac{(50)(48) + (52)(43) + (52)(54) + (52)(63)}{48 + 43 + 52 + 63}$$

$$\bar{x} = \frac{10816}{208} = \boxed{52.5}$$

⇒ C.M of fish:

$$\bar{x} = \frac{(28.5)(19) + (28.5)(21) + (28.5)(28) + (28.5)(46)}{19 + 21 + 28 + 46}$$

$$\bar{x} = \frac{3249}{114} = \boxed{28.5}$$

C.M of rice:

$$\bar{x} = \frac{(263.5)(315) + (263.5)(276) + (263.5)(243) + (263.5)(220)}{315 + 276 + 243 + 220}$$

$$\bar{x} = \frac{271188}{1054} = \boxed{257.2}$$

Q:1 (B)

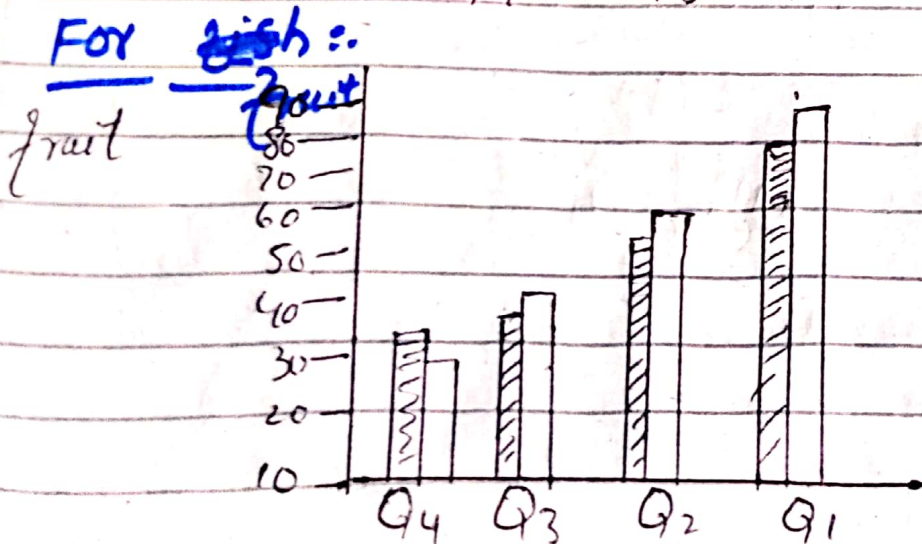
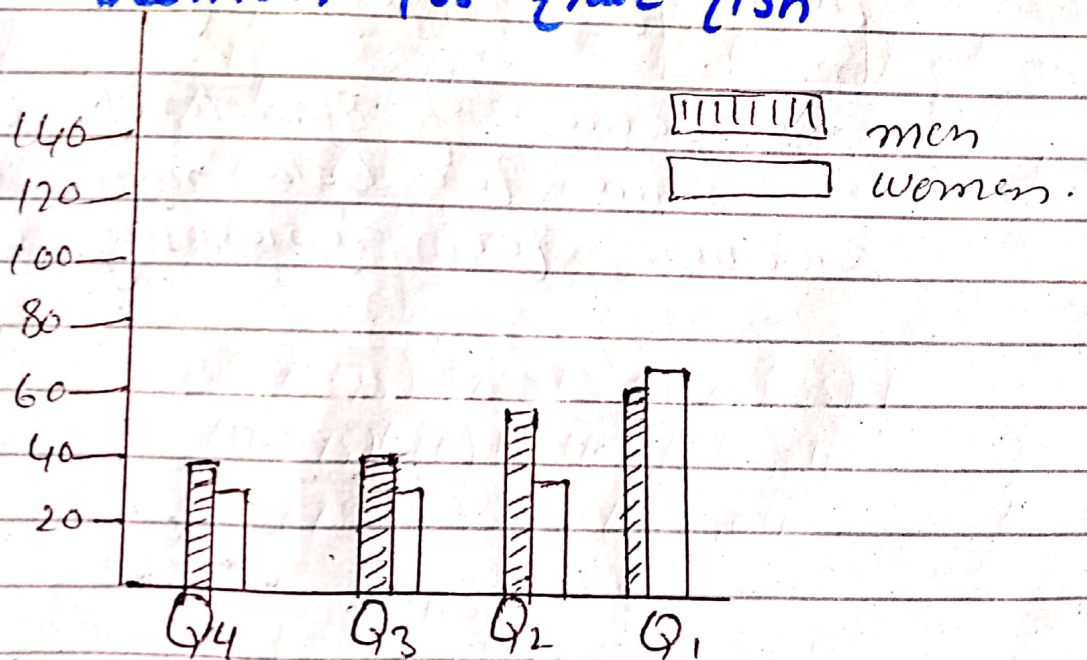
Milk, root vegetables and wheat flour are very low for both men and women in Q₄ and Q₃ it increase high in Q₂ and Q₁ such as that eat most vegetable consume much

(b)

more wheat, milk, root vegetables and flour than those who eat less fresh vegetable.

(c) value of mean in rice decreasing from Q_4 to Q_1 but in fruit and fish mean value of rice from Q_4 to Q_1 in men and women.

(d) Diagram between men and women for fruit, fish



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E:

According to the information of the given table it shows that men needs more food to maintain their energy level.

F:

Standard deviation $S = \sqrt{\frac{\sum x^2}{n} - \bar{x}^2}$
According to the mentioned formula the value of the standard deviation of mean is more than in fresh vegetables fruits, flour, total grains and meat.

The value of standard deviation is same for both men and women for remaining categories.

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Q:2 (a) Describe the purpose of census?

Ans: A census is the process of collecting and recording information about the number given population.

- purpose of census to count the entire population objects in given observation.
- The census tell us where are going as a nation. It help the govt decide how to distribute funds and assistance.

(B) Explaining how it different from a sample survey and...
Difference between census and sample survey

⇒ Sample survey:

∴ census and

Sampling survey are two methods of collecting data about

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the population.

Survey sampling describe the process of selecting a sample of element from a target population to conduct a survey.

A sample survey refers to a group of or section of a population from which information is to be obtained the process of sampling is to reduce the cost or the amount of work that it would take to survey the entire target population.

⇒ Census:-

A Survey that measure the entire target population is called a census.

The census tell us that who are and where we

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are going as a nation
it helps the government
to distribute funds and
assistance.

⇒ C
the 2011 UK census ~~is~~ attracted
a response rate of 94% of the
population. ---

Ans:
From the given information 2011
UK ~~at~~ census attracted a
response rate of about 94%
which is good but it can rise
any kind of error unless
situation of complete it can
be cause of an error or
any be rise error or more.

⇒ D
Ans: In the UK census, almost 17,000 ---
in the census about asking
a specific group / Religion may
cause of bad behavior or
~~are~~ any misunderstanding
it possible that someone

②

not like to answer of these kind of question.

⑤: Discuss the potential problem in conducting the 2011 UK. --- there is alot of potential problem in conducting the 2011 UK census online the first and main issue is that the availability of online connection. and internal to every person of the country is almost impossible.

the second thing is that there is also increase the problem in personal behavior of person they may give the response or not according to their own taste or behavior. the only way to overcome this problem to giving the connection to the whole country and make

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Sore and punctual to every person to give the response.

(F) :- Discuss the potential problem in conducting incorporating data.

Ans According to Government agencies census itself means study of every object under the observation. and it is quite complicated ~~task~~ to perform to government agencies to go to every single person and collect the total information because there are a lot of thing that have been done by these agencies not only to complete the census.

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Q:3 (a) Find:

<u>Rainfall</u>	<u>Number of years</u>
20-24	1
25-29	3
30-34	5
35-39	8
40-44	5
45-49	2
50-54	0
55-59	1

Arithmetic mean

$$\bar{u} = \frac{\sum f u}{\sum f}$$

Classes	f	u	f u
20-24	1	22	-14.8
25-29	3	27	-9.8
30-34	5	32	-4.8
35-39	8	37	0.2
40-44	5	42	5.2
45-49	2	47	10.2
50-54	0	52	15.2
55-59	1	57	20.2
	920	20.2	

$$A.M = \frac{\sum f u}{\sum f}$$

$$= 920$$

$$\frac{920}{25} = \boxed{36.8}$$

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Geometric mean:

	f	$\sum f_i$	$\log u$
20-24	1	22	1.34
25-29	3	27	1.43
30-34	5	32	1.50
35-39	8	37	1.56
40-44	5	42	1.62
45-49	2	47	1.67
50-54	0	52	1.71
55-59	1	57	1.75
			12.58

$$G.M = \text{Anti log} \left(\frac{\sum \log u}{\sum f} \right)$$

$$= \text{Anti log} \left(\frac{12.58}{25} \right)$$

$$= 0.5032$$

$$\text{Anti log} = \boxed{3.1856}$$

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→ Harmonic Mean:

	f	x	f/x
20-24	1	22	0.45
25-29	3	27	0.11
30-34	5	32	0.15
35-39	8	37	0.21
40-44	5	42	0.11
45-49	2	47	0.04
50-54	0	52	0
55-59	1	57	0.01

0.76

$$H.M = \frac{25}{0.76} = \boxed{32.89}$$

Median:

20	f	e.B	e.F
20-24	1	19.5-24.5	1
25-29	3	24.5-29.5	4
30-34	5	29.5-34.5	9
35-39	8	34.5-39.5	17
40-44	5	39.5-44.5	22
45-49	2	44.5-49.5	24
50-54	0	49.5-54.5	24
55-59	1	54.5-59.5	25

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$$\text{Median} = Lt + h \left\{ \frac{\frac{n}{2} - c}{f} \right\}$$

$$1 = \frac{n}{2} = \frac{25}{2} = 12.5$$

Median 12.5 items

Median lies in the group 35-39

$$\text{Median} = 34.5 + \frac{4}{8} (12.5 - 9)$$

$$= 34.5 + \frac{4}{8} (3.5)$$

$$= 34.5 + 1.75$$

$$= \frac{276 + 14}{8} = 290$$

$$\text{Median} = \boxed{36.25}$$

⇒ Mode:

20-24	1	Mode = $Lt + \frac{fm - fo}{2fm - fo - fi} \times h$
25-29	3	
30-34	5	$= 35 + \left(\frac{8-5}{2(8)-5-5} \right) \times 4$
35-39	8	
40-44	5	$35 + \left(\frac{3}{8} \times 4 \right)$
45-49	2	
50-54	0	$35 + 2$
55-59	1	
		$= 37$

Ans

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Quartiles:

1st Q_1

$$Q_1 = L + h/f \left(\frac{n}{4} - c \right)$$

$$n/4 = \frac{\sum f}{4} = \frac{25}{4} = 6.25$$

$$= 29.5 + 5/5 (6.25 - 4)$$

$$Q_1 = \boxed{32.75}$$

$\Rightarrow Q_2$ $L + h/f \left(\frac{n}{4} - c \right)$

$$n/4 = \frac{\sum f}{4} = \frac{25}{4} = 6.25$$

$$Q_2 = 34.5 + 5/5 (6.25 - 9)$$

$$Q_2 = \boxed{37.687}$$

Q_3

$$Q_3 = L + h/f \left(\frac{n}{4} - c \right)$$

$$Q_3 = 39.5 - 5/5 (18.75 - 17)$$

$$Q_3 = \boxed{41.25}$$

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Deciles:

$$D_m = l + h \cdot f \left(\frac{m \cdot n}{10} - c \right)$$

$$D = l + h \cdot f \left(\frac{8n}{10} - c \right)$$

$$\frac{8n}{10} = \frac{8(25)}{10} = \frac{200}{10} = 20$$

using the ogive table

$$D_8 = 39.5 + 5/5 (20 - 17)$$

$$D_8 = 42.5$$

⇒ Percentiles:

$$P_m = l + h \cdot f \left(\frac{m \cdot n}{100} - c \right)$$

$$\frac{45n}{100} = \frac{42(25)}{100} = 11.25$$

using the table

$$P = 34.5 + 5/8 (11.25 - 9)$$

$$P = 35.906$$

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Range:

Rang	f	c.B
20-24	1	19.5-24.5
25-29	3	24.5-29.5
30-34	5	29.5-34.5
35-39	8	34.5-39.5
40-44	5	39.5-44.5
45-49	2	44.5-49.5
50-54	0	49.5-54.5
55-59	1	54.5-59.5

Range = largest value - smallest value

$$= 59.5 - 19.5$$

$$\text{Rang} = \boxed{40}$$

⇒ Mean Deviation

Classes	f	π	$n - \pi$	
20-24	1	22	14.8	
25-29	3	27	29.4	
30-34	5	32	24	
35-39	8	37	1.6	
40-44	5	42	26	
45-49	2	47	20.4	
50-54	0	52	0	
55-59	1	57	20.2	136.2

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(3)

$$M.O.D = \frac{\sum f / n - \bar{x}}{\sum f}$$

$$\bar{x} = 36.8$$

$$M.O.D = \frac{136.4}{25}$$

$$= \boxed{5.456}$$

Variance:

	f	x	fx
20-24	1	20	-14.8
25-29	3	81	-9.8
30-34	5	160	-4.2
35-39	8	296	0.2
40-44	5	210	5.2
45-49	2	94	10.2
50-54	0	0	15.2
55-59	1	57	20.2

Variance

21.6

$$\frac{\sum f(x - \bar{x})^2}{\sum f}$$

$$= \frac{25(21.6)}{25}$$

$$= \boxed{21.6}$$

(20)

⇒ Standard deviation:

	f	π_i	$f\pi$	$\pi - \bar{\pi}$
20-24	1	22	22	-14.8
25-29	3	27	81	-9.8
30-34	5	32	160	-4.8
35-39	8	37	296	0.2
40-44	5	42	210	5.2
45-49	2	47	94	10.2
50-54	0	52	0	15.2
55-59	1	57	57	20.2
			920	21.6

We know that

$$\frac{\sqrt{\sum f(\pi - \bar{\pi})^2}}{\sum f}$$

$$S = \sqrt{\frac{25(21.6)}{25}}$$

$$S = \sqrt{\frac{540}{25}} = \sqrt{21.6}$$

$$S = \boxed{4.64}$$

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Coefficient OF variation:

$$C.V = S/\bar{x} \times 100$$

$$C.V = 7.413$$

$$36.8$$

$$C.V = \boxed{0.2014}$$

⇒ Skewness:

$$SK = \frac{\text{Mean} - \text{mode}}{\text{Standard deviation}}$$

$$SK = 36.8 - 37$$

$$7.413$$

$$SK = \boxed{-0.026}$$

Q:3(b)

Arithmetic mean:

$$A.M \quad N = 1, 3, 5, 8, 5, 2, 0, 1$$

$$0, 1, 1, 3, 5, 5, 8$$

$$\frac{0+1+1+2+3+5+5+8}{8}$$

$$\bar{x} = \frac{25}{8} = 3.125$$

write the response

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⇒ Geometric and Harmonic mean

$$G.M = \text{antilog} \left(\frac{1}{n} \sum \log x \right)$$

$$n = 1, 3, 5, 8, 5, 2, 0, 1$$

$$H.M = \frac{\sum x}{\sum \frac{1}{x}}$$

Harmonic and geometric mean is not possible because there is zero in the given data

⇒ Median:

$$\begin{aligned} \tilde{x} &= \left(\frac{n+1}{2} \right)^{\text{th}} \\ &= \left(\frac{8+1}{2} \right)^{\text{th}} = \boxed{4.5^{\text{th}}} \end{aligned}$$

⇒ Mode:

$$\tilde{x} = 4^{\text{th}} + 0.5(5^{\text{th}} - 4^{\text{th}})$$

$$0, 1, 1, 2, 3, 5, 5, 8$$

$$\tilde{x} = 2 + 0.5 = 2.5$$

$$\tilde{x} = \boxed{2.5}$$

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⇒ Mode =

Repeated data of the value

1, 3, 5, 8, 5, 2, 01

$$n = \boxed{1, 5}$$

⇒ Quartiles =

$$Q_1 \left(\frac{n}{4} + 1 \right)^{\text{th}}$$

$$= \frac{(25 + 1)^{\text{th}}}{4}$$

$$= \boxed{7.25}$$

$$Q_2 \left(\frac{n}{4} + 1 \right)^{\text{th}}$$

$$\left(\frac{2 \times 25}{4} + 1 \right) = \frac{50 + 1}{4} = \frac{51}{4}$$

$$= \boxed{12.75}$$

$$Q_3 \left(\frac{n}{4} + 1 \right)^{\text{th}}$$

$$\left(\frac{3 \times 25}{4} + 1 \right)^{\text{th}} = \frac{75 + 1}{4} = \frac{76}{4} = 19$$

$$= \boxed{19}$$

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Q:4

$$\left(\frac{n}{4} + 1\right)^{\text{th}}$$
$$\left(\frac{4 \times 25}{4} + 1\right)^{\text{th}} \left(\frac{100}{4} + 1\right)^{\text{th}}$$

$$= \boxed{25-25}$$

⇒ Deciles:-

$$D_1 = \left(\frac{n}{10} + 1\right)^{\text{th}}$$

$$D_1 = \left(\frac{25}{10} + 1\right)^{\text{th}} \left(\frac{26}{10}\right)^{\text{th}} = \boxed{2.6}$$

⇒ D₂

$$D_2 = \left(\frac{n}{10} + 1\right)^{\text{th}}$$
$$= \left(\frac{2 \times 25 + 1}{10}\right)^{\text{th}}$$

$$= \left(\frac{50}{10} + 1\right)^{\text{th}} = \left(\frac{51}{10}\right)^{\text{th}} \quad \boxed{5.1}$$

⇒ D₃

$$D_3 = \left(\frac{n}{10} + 1\right)^{\text{th}}$$
$$= \left(\frac{3 \times 25 + 1}{10}\right)^{\text{th}}$$

$$\left(\frac{76}{10}\right)^{\text{th}} \quad 7.6$$

⇒ D₄

$$D_4 = \left(\frac{n+1}{10}\right)^{\text{th}}$$

$$= 4 \left(\frac{n+1}{10}\right)^{\text{th}}$$

$$= \left[4 \left(\frac{8+10}{10}\right)^{\text{th}}\right]$$
$$= 3.6^{\text{th}}$$

$$= 10.6 (2-1)$$

$$\boxed{D_4 = 1.6}$$

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Percentiles

$$P_m = m \left(\frac{n+1}{100} \right)^{th}$$

$$P_1 \left(\frac{n}{100} + 1 \right)^{th}$$

$$P_1 \left(\frac{25}{100} + 1 \right)^{th}$$

$$P_1 = \boxed{1.25}$$

⇒ P₂:

$$\left(\frac{n}{100} + 1 \right)$$

$$\left(\frac{2 \times 25}{100} + 1 \right)^{th}$$

$$\left(\frac{50}{100} + 1 \right)^{th}$$

$$\frac{51}{100} = \boxed{0.51}$$

⇒ P₃

$$\left(\frac{n}{100} + 1 \right)^{th}$$

$$\left(\frac{3 \times 25}{100} + 1 \right)^{th}$$

$$\frac{75 + 1}{100} = \frac{76}{100} = \boxed{0.76}$$

⇒ P₄

$$\left(\frac{n}{100} + 1 \right)^{th}$$

$$\left(\frac{4 \times 25}{100} + 1 \right)^{th}$$

$$\left(\frac{100}{100} + 1 \right)^{th}$$

$$\frac{101}{100} = \boxed{1.01}$$

2b

⇒ Range:

Range = Maximum - minimum

$$\text{Range} = 8 - 0$$

$$\boxed{\text{Range} = 8}$$

⇒ Mean deviations:

$$M.O.D = \frac{\sum (x - \bar{x})}{n} \quad \bar{x} = 3.125$$

x	x - \bar{x}
1	2.125
3	0.125
5	1.875
8	4.875
5	1.875
2	1.125
0	3.125
1	2.125
	<hr/> 17.25

M.O.D = $\frac{17.25}{8}$

$$\boxed{M.O.D = 2.156}$$

Quartile deviation:

$$Q.D = \frac{Q_3 - Q_1}{2}$$

$$Q.D = \frac{5 - 1}{2} = \frac{4}{2}$$

$$\boxed{Q.D = 2}$$

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⇒ Variance:

x	x^2	
1	1	$s^2 = \frac{129}{8} = \frac{(25)^2}{8}$
3	9	
5	25	$s^2 = 16 \cdot 125 - 9 \cdot 766$
8	64	$s^2 = 6.359$
5	25	
2	4	
0	0	
$\frac{1}{25}$	$\frac{1}{129}$	

⇒ Standard deviation

$$s = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$$

$$s = \sqrt{\frac{129}{8} - \left(\frac{25}{8}\right)^2}$$

$$s = \sqrt{6.359}$$

$$s = 2.521$$

⇒ Skewness

$$SK = \frac{3(\text{mean} - \text{median})}{s}$$

$$SK = \frac{3(3.125 - 2.5)}{2.521} = SK \ 0.745$$

5 The end