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Department - Allied - Health Science

Semister - 6th

Paper - Biostatistic

★ Overall mean for men

⇒ Fresh vegetable	$(204 + 259 + 266 + 317) / 4$	= 261.5 grams
⇒ Fruits	$(31 + 45 + 69 + 105) / 4$	= 62.5 grams
⇒ Rice	$(367 + 337 + 269 + 246) / 4$	= 304.75 grams
⇒ Fish	$(23 + 28 + 31 + 44) / 4$	= 31.5 grams
⇒ Meat	$(70 + 61 + 69 + 77) / 4$	= 69.25 grams

★ Overall Mean for women.

		Overall mean
⇒ Fresh vegetable	$(178 + 235 + 266 + 304) / 4$	245.7 grams
⇒ Fruits	$(28 + 46 + 70 + 121) / 4$	66.25 grams
⇒ Rice	$(315 + 276 + 243 + 220) / 4$	263.5 grams
⇒ Fish	$(19 + 21 + 28 + 46) / 4$	28.5 grams
⇒ Meat	$(48 + 43 + 54 + 63) / 4$	52 grams

Standard deviation :-

$$\text{Formula: } \sigma = \sqrt{\frac{1}{N} \sum (x_i - \bar{x})^2}$$

Standard deviation for men

Fresh vegetable

Mean is 261.5 so

$$\text{put value } \sigma = \sqrt{\frac{(204-261.5)^2 + (259-261.5)^2 + (266-261.5)^2 + (317-261.5)^2}{4}}$$

$$\sigma = \sqrt{\frac{(-57)^2 + (-2.5)^2 + (4.5)^2 + (55.5)^2}{4}}$$

$$\sigma = \sqrt{\frac{(3306.25) + 6.25 + 20.25 + 3080.25}{4}}$$

$$\sigma = \sqrt{\frac{6413}{4}} = \sqrt{1603.25}$$

$$\sigma = \boxed{40.04}$$

Fruits : Mean = 62.5

$$\text{put value } \sigma = \sqrt{\frac{(31-62.5)^2 + (45-62.5)^2 + (69-62.5)^2 + (105-62.5)^2}{4}}$$

$$\sigma = \sqrt{\frac{(31-62.5)^2 + (45-62.5)^2 + (69-62.5)^2 + (105-62.5)^2}{4}}$$

$$\sigma = \sqrt{\frac{(-31.5)^2 + (-17.5)^2 + (6.5)^2 + (42.5)^2}{4}}$$

$$\sigma = \sqrt{\frac{992.25 + 306.25 + 42.25 + 1806.25}{4}}$$

$$\sigma = \sqrt{\frac{3147}{4}} = \sqrt{786.75} = \boxed{28.04}$$

Rice

Mean = 304.75

put value $\sigma = \sqrt{\frac{(367-304.75)^2 + (337-304.75)^2 + (209-304.75)^2 + (246-304.75)^2}{4}}$

$$\sigma = \sqrt{\frac{(62.25)^2 + (32.25)^2 + (-35.75)^2 + (-58.75)^2}{4}}$$

$$\sigma = \sqrt{\frac{9644.74}{4}} = \sqrt{2411.1}$$

$$\sigma = \boxed{49.1}$$

Fish :- Mean = 31.5

neat

put value

$$\sigma = \sqrt{\frac{(23-31.5)^2 + (28-31.5)^2 + (31-31.5)^2 + (44-31.5)^2}{4}}$$

$$\sigma = \sqrt{\frac{(-8.5)^2 + (-3.5)^2 + (-0.5)^2 + (12.5)^2}{4}}$$

$$\sigma = \sqrt{\frac{72.25 + 12.25 + 0.25 + 156.25}{4}}$$

$$\sigma = \sqrt{\frac{241}{4}}$$

$$\sigma = \sqrt{60.25}$$

$$\sigma = \boxed{7.8}$$

Meat Mean value = 69.25

put value ::

$$\sigma = \frac{\sqrt{(70-69.25)^2 + (61-69.25)^2 + (69-69.25)^2 + (77-69.25)^2}}{4}$$

$$\sigma = \frac{\sqrt{(0.75)^2 + (-8.25)^2 + (-0.25)^2 + (7.75)^2}}{4}$$

$$\sigma = \frac{\sqrt{0.56 + 68.06 + 0.06 + 60.06}}{4}$$

$$\sigma = \frac{\sqrt{128.74}}{4} = \sqrt{32.2}$$

$$\sigma = \boxed{5.7}$$

Standard deviation (women)

Formula:
$$\sigma = \sqrt{\frac{1}{N} \sum_{i=1}^N (x_i - \mu)^2}$$

stand
mean
put value

* Fresh vegetable : Mean = 245.75

put value:
$$\sigma = \sqrt{\frac{(178 - 245.75)^2 + (235 - 245.75)^2 + (266 - 245.75)^2 + (304 - 245.75)^2}{4}}$$

$$\sigma = \sqrt{\frac{4596 + 115.6 + 410 + 3393}{4}}$$

$$\sigma = \sqrt{\frac{8508.6}{4}} = \sqrt{2127}$$

$$\sigma = \boxed{46.1}$$

Standard deviation of fruits.

$$\text{Mean} = 66.25$$

put value:
$$\sigma = \sqrt{\frac{(28 - 66.25)^2 + (46 - 66.25)^2 + (70 - 66.25)^2 + (121 - 66.25)^2}{4}}$$

$$\sigma = \sqrt{\frac{1463 + 410 + 14 + 2997}{4}} = \sqrt{\frac{4884}{4}}$$

$$\sigma = \sqrt{\frac{1221}{4}} = \sigma = \boxed{34.95}$$

Standard deviation of Rice

$$\text{Mean} = 263.5$$

put value

$$\sigma = \sqrt{\frac{(315 - 263.5)^2 + (276 - 263.5)^2 + (243 - 263.5)^2 + (220 - 263.5)^2}{4}}$$

$$\sigma = \sqrt{\frac{2652.25 + 156.25 + 420.25 + 1892.25}{4}}$$

$$\sigma = \sqrt{\frac{5121}{4}} = \sqrt{1280.25}$$

$$\sigma = \boxed{71.6}$$

★ Standard deviation of Fish

$$\text{Mean} = 28.5$$

put value:
$$\sigma = \sqrt{\frac{(19 - 28.5)^2 + (21 - 28.5)^2 + (28 - 28.5)^2 + (46 - 28.5)^2}{4}}$$

$$\sigma = \sqrt{\frac{(-9.5)^2 + (-7.5)^2 + (-0.5)^2 + (17.5)^2}{4}}$$

$$\sigma = \sqrt{\frac{90.25 + 56.25 + 0.25 + 306.25}{4}} = \sqrt{\frac{453}{4}}$$

$$\sigma = \sqrt{113.25} = \boxed{10.6}$$

Standard deviation of meat.

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$$\text{mean} = 52$$

put value :-
$$\sigma = \sqrt{\frac{(48-52)^2 + (43-52)^2 + (54-52)^2 + (63-52)^2}{4}}$$

$$\sigma = \sqrt{\frac{16 + 81 + 4 + 121}{4}} = \sqrt{\frac{222}{4}}$$

$$\sigma = \sqrt{55.5} = \boxed{7.4}$$

Milk :- The data given in the chart indicate that intake of milk is very less for both genders.

Root vegetable :- The root of vegetable is also intake in every less amount for both genders. Although men consumption is greater than woman.

Wheat flour :- The consumption of wheat flour is also below average.

⇒ Milk, Root, vegetable and wheat flour are essential food or nutrients for women as well as men health. It must provide in the required amount.

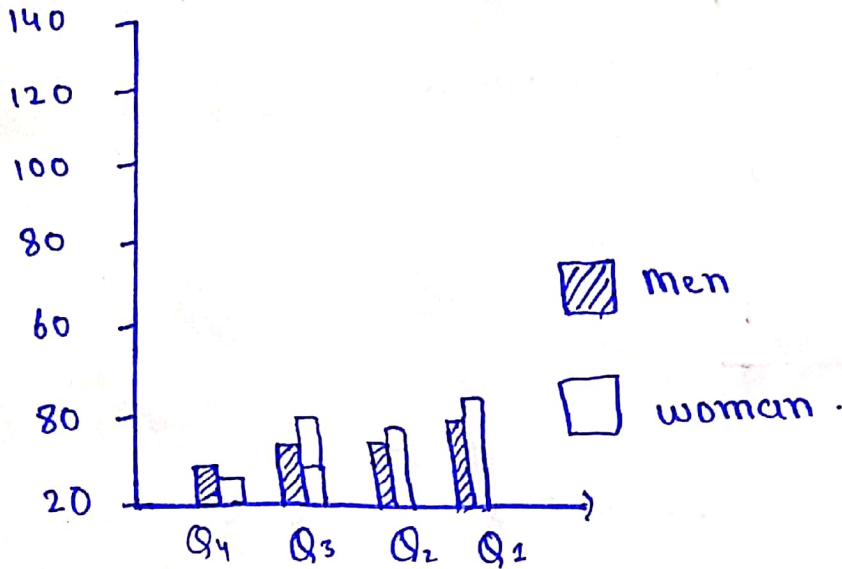
Rice :- The mean consumption of men is 304 grams while the women is 263 grams which indicate that men consumption is higher than women.

Fruit :- The mean of men is 62.5 grams while the mean consumption of women is 66.25 grams. It indicate the woman consumed little much more than men.

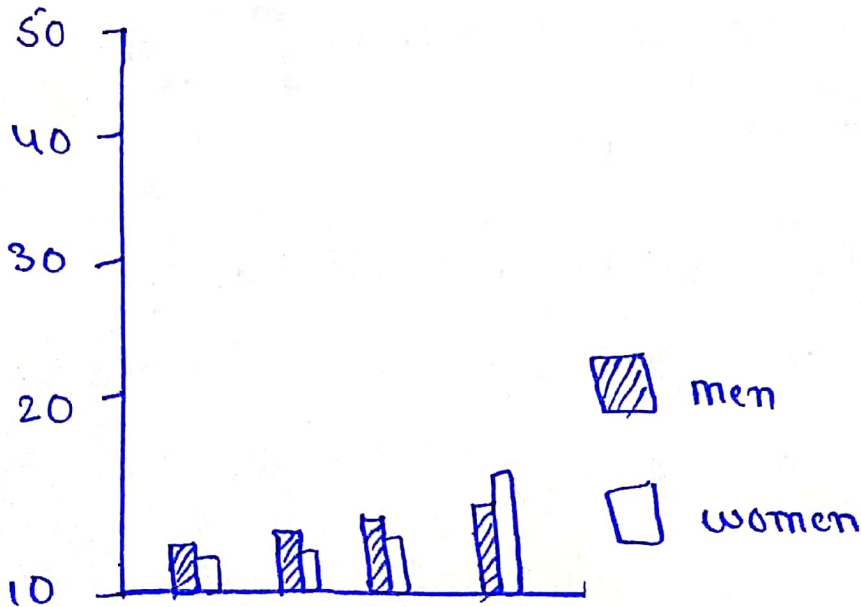
Fish :- The mean consumption for men is 31.5 grams while for women is 28.5 grams. Indicate the consumption of men is more than women.

That's why men have more strongest immune system than women.

" Draw a Suitable diagramme "
For Fruit



For Fish



Q NO 1 part E

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E) \Rightarrow In fresh vegetable quantity women are more than quantity men. Each women consumed 78 grams while men consumed 62 grams.

Q NO 1 part F

\Rightarrow In fruit men standard deviation is less than woman. In rice standard deviation is for women is greater than man.

\Rightarrow In fish and meat standard deviation for woman is greater than men.

\Rightarrow In fresh vegetables standard deviation for women is greater than men.

Q NO 1
End

(a) Describe the purpose of a census

purpose of Census :- The purpose of census is to count the entire population of country & location of every person of the country.

B) Census

=> The collection of data about every member of the population

=> Detailed information is collected that takes long time to complete.

=> Conducted by the government.

Survey

=> The collection of data from a part or community of the population.

=> Information are collected briefly that takes short time to complete.

Can conduct by anyone.

C) => From the given information 2011 UK Census attached a response rate of 94%. indicate that it represents the Equiviment of the people that may be accurate

d) Asking such question about a specific religion indicate harsh behaviour & religion hate public members in the population, such type of question about religion are invalidate.

e) problem conducted

① Guideline :- people donot understand that how to fill the census paper.

How to overcome :- To guide people that how to fill online census paper

② Lack of knowledge :- people donot understand them of the question.

How to overcome Appropriate knowledge should be provided.

③ Lack of Interest :- People may not take interest to fill the census form.

How to overcome :- To tell them about the importance of census - that it is for your good well to take interest in it.

7) potential problem in incorporating additional data held by govt agencies.

=> Census is such a difficult task to perform such problem occurring during performing census.

- ① Servers Required :- large server is required to incorporate the additional data.
- ② Experts are Required :- Expert are required to conduct & maintain the data.
- ③ Less accuracy :- The data collected may not be accurate.

Q NO 2 End

Rain fall	f No of years	$x = \text{mid} = \text{points}$	fx	f/x	$\log(x)$	$f \log(x)$	$x - \bar{x}$	$(x - \bar{x})^2$	$f(x - \bar{x})^2$
20-24	1	22	22	0.046	1.34	1.34	-14.8	219.04	219.04
25-29	3	27	81	0.012	4.29	4.29	-9.8	96.04	288.12
30-34	5	32	160	0.15	7.5	7.5	4.8	23.04	115.2
35-39	8	37	296	0.21	12.48	12.48	-2	0.04	0.32
40-44	5	42	210	0.11	8.1	8.1	5.2	27.04	135.2
45-49	2	47	94	0.04	3.34	3.34	10.2	104.04	208.04
50-54	0	52	0	0	0	0	15.2	231.04	0
55-59	1	57	57	0.017	1.75	1.75	20.2	408.04	408.04
Total	25		920	0.693	38.8				1373.96

Rain fall	(f) Number of years	$f(x - \bar{x})$	(C-L) class boundaries	(C-f) cumulative Frequency
20-24	1	14.8	19.5-24.5	1
25-29	3	29.4	24.5-29.5	4
30-34	5	24	29.5-34.5	9
35-39	8	1.6	34.5-39.5	17
40-44	5	26	39.5-44.5	22
45-49	2	20.4	44.5-49.5	24
50-54	0	0	49.5-54.5	24
55-59	1	20.2	54.5-59.5	25

$$\textcircled{1} \text{ A.M } \frac{\sum_{i=1}^n f_i x_i}{\sum_{i=1}^n f_i} = \frac{920}{25}$$

$$\text{A.M } \sum_{i=1}^n f_i$$

$$\boxed{\text{A.M} = 36.80}$$

$$\textcircled{2} \text{ H.M } = \frac{\sum_{i=1}^n f_i}{\sum_{i=1}^n \left(\frac{f_i}{x_i} \right)} = \frac{25}{0.693}$$

$$\sum_{i=1}^n \left(\frac{f_i}{x_i} \right)$$

$$\boxed{\text{H.M} = 36.08}$$

$$\textcircled{3} \text{ G.M } = \text{Anti-log} \left[\frac{\sum_{i=1}^n f_i \log(x_i)}{\sum_{i=1}^n f_i} \right]$$

$$= \text{Anti-log} \left(\frac{38.8}{25} \right)$$

$$= \text{Anti-log} (1.552)$$

$$\boxed{\text{G.M} = 35.48}$$

$$\text{Median} = \left(\frac{n}{2}\right)^{\text{th}}$$

$$= \left(\frac{25}{2}\right)^{\text{th}}$$

$= (12.5)^{\text{th}}$, which is lie B/w in the class 34.5-39.5

Therefore

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

$$= 34.5 + \frac{5}{8} (12.5 - 9)$$

$$= 34.5 + \frac{5}{8} (3.5)$$

$$= 34.5 + 2.19$$

$$\boxed{\text{Median} = 36.69}$$

5

Range = Height class upper boundaries.

Range = lowest class lower boundaries.

$$= 59.5 - 19.5$$

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

$$\text{Mode} = \frac{L + \frac{f_m - f_1}{(f_m - f_1) + (f_m - f_2)} \times h}{1}$$

L = lower class boundaries of the modal class

f_m = frequency of the modal class

f_1 = frequency associated with class

h = width of class interval

So, the mode, can be

$$\begin{aligned} \text{Mode} &= 34.5 + \frac{(8-5)}{(8-5) + (8-5)} \times 5 \\ &= 34.5 + \frac{3}{3+3} \times 5 \end{aligned}$$

$$\text{Mode} = 37$$

7

Quartile \therefore The three values which divide the distribution into four equal parts are called the quartiles.

\Rightarrow the values are denoted by Q_1 , Q_2 , and Q_3

Q_1 is called the lower quartiles and Q_3 are called upper quartiles. Q_2 is called median.

So we shall ~~not~~ calculate Q_1 & Q_3

$$Q = \left(\frac{n}{4}\right)^{\text{th}}$$

$$= \left(\frac{25}{4}\right)^{\text{th}}$$

$$= (6.25)^{\text{th}} \text{ which associated with in the class } (29.5-34.5)$$

$$Q_1 = L + \frac{h}{7} \left(\frac{n}{4} - c.f\right)$$

$$= 29.5 + \frac{5}{5} (6.25 \cdot 4)$$

$$= 29.5 + 2.25$$

$$Q_1 = 31.75$$

$$Q_3 = \left(\frac{3n}{4}\right)^{\text{th}}$$

$$= \left(\frac{3 \times 25}{4}\right)^{\text{th}}$$

$$= (18.75)^{\text{th}} \text{ which correspond in the class}$$

$$(39.5 - 44.5) \text{ there for}$$

$$Q_3 = L + \frac{h}{7} \left(\frac{3n}{4} - c.f\right)$$

$$= 39.5 + \frac{5}{5} (18.75 - 17)$$

$$= 39.5 + 1.75$$

$$Q_3 = 41.25$$

⑧ Deciles :- \Rightarrow which divided the distribution into ten equal parts are called deciles. which is denoted by D_1, D_2, \dots, D_9

\Rightarrow The calculation of each deciles to be calculated is too large in time consuming.

So, for the practice. we can calculate and time consuming

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

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

= 5th, which correspond in the class

(29.5 - 34.5) Therefore

$$D_2 = L + h/f \left(\frac{2n}{10} - C.f \right)$$

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

$$29.5 + 1$$

$$D_2 = 30.5$$

(9) percentile :- which is divided the distribution into hundred equal parts are called percentile which is denoted by

$$P_1, P_2 \dots P_{99}$$

As,

$$P_{30} = \left(\frac{30n}{100} \right)^{th}$$

$$= \left(\frac{30 \times 25}{100} \right)$$

$$= (7.5)^{th} \text{ which associated in the class } (29.5 - 34.5)$$

$$P_{30} = L + \frac{h}{f} \left(\frac{30n}{100} - c.f \right)$$

$$= 29.5 + \frac{5}{5} (7.5 - 4)$$

$$= 29.5 + 3.50$$

$$P_{30} = 33$$

$$\textcircled{10} \quad \text{M.D} \quad \frac{\sum_{i=1}^n f_i |x - \bar{x}|}{\sum_{i=1}^n f_i}$$

$$= \frac{136.4}{25}$$

$$\text{M.D} = 5.46$$

$$\textcircled{11} \quad \text{variance} =$$

$$\frac{\sum_{i=1}^n f_i (x - \bar{x})^2}{\sum_{i=1}^n f_i}$$

$$\frac{\cancel{136.4}}{\cancel{25}} = \frac{1373.96}{25}$$

$$\text{variance} = 54.96$$

$$\text{Standard deviation} = \sqrt{\text{variance}}$$

$$= \sqrt{54.96}$$

$$\boxed{SD = 7.41}$$

$$(13) \text{ Coefficient of Variation (C.V.)} =$$

$$\frac{S.D.}{\bar{x}} \times 100$$

$$= \frac{7.41}{36.80} \times 100$$

$$\boxed{C.V. = 20.14}$$

$$(14) \text{ Quartile Deviation (Q.D.)} = \frac{Q_3 - Q_1}{2}$$

where $Q_3 = 41.25$ and $Q_1 = 31.75$

$$Q.D. = 41.25 \text{ and } Q_1 = 31.75$$

$$Q.D. = \frac{41.25 - 31.75}{2}$$

$$\boxed{Q.D. = 4.75}$$

42	0.0238	1.6232	0.2	27.04	0.2
42	0.0238	1.6232	5.2	27.04	5.2
42	0.0238	1.6232	5.2	27.04	5.2
42	0.0238	1.6232	5.2	27.04	5.2
42	0.0238	1.6220	5.2	3.10	5.2
42	0.0212	1.6720	1.76	3.10	1.76
42	0.0212	1.6720	1.76	3.10	1.76
42	0.019	1.7558	20.2	408.04	20.2
Total	0.73	38.92		1172.12	136.40

Q NO 2

part B

$$\textcircled{1} \text{ A.M } \frac{\sum_{i=1}^n x_i}{n} = \frac{920}{25}$$

$$\boxed{\text{A.M} = 36.8}$$

$$\textcircled{2} \text{ H.M } = \frac{n}{\sum_{i=1}^n (1/x_i)} = \frac{25}{0.73}$$

$$\boxed{\text{H.M} = 34.25}$$

$$\textcircled{3} \text{ G.M. - Antilog } \left[\frac{\sum_{i=1}^n \log(x_i)}{n} \right]$$

$$= \text{Antilog} \left[\frac{38.92}{25} \right]$$

$$= \text{Anti-log} (1.56)$$

$$\boxed{\text{G.M.} = 36.04}$$

$\textcircled{4}$ Mode : Most repeated value is called mode.

So, $\boxed{\text{mode} = 37}$

$\textcircled{5}$ Median : is the mid-value of a data set.

$$\text{Median} = \left[\left(\frac{n}{2} \right) + 1 \right] \text{th}$$

$$= \left[\left(\frac{25}{2} + 1 \right) \text{th} \right]$$

$$= (12 + 1) \text{th}$$

Median = 13th integer of a data set

$$\boxed{\text{Median} = 37}$$

Quantile

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

$$Q_1 = \left[\left(\frac{25}{4} \right) + 1 \right] \text{th}$$

$$= (6.25 + 1) \text{th}$$

$$= (7.25) \text{th}$$

$$= 7 \text{th}$$

$$Q_1 = 32$$

$$Q_3 = \left[\left(\frac{3n}{4} \right) + 1 \right] \text{th}$$

$$= \left[\left(\frac{3 \times 25}{4} \right) + 1 \right] \text{th} \Rightarrow (19.75) \text{th}$$

$\rightarrow (20) \text{th}$, Integer

$$Q_3 = 42$$

(7) Deciles :-

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

$$= (5 + 1) \text{th} \Rightarrow 6 \text{th integer}$$

$$D_2 = 32$$

⑧ percentile :-

$$\begin{aligned} \text{As } P_3 &= \left[\left(\frac{30n}{100} \right) + 1 \right] \text{th} \\ &= \left[\left(\frac{30 \times 25}{100} \right) \right] \text{th} \\ &= (7.50 + 1) \text{th} = (8.50) \text{th} \end{aligned}$$

$P_{30} = 9\text{th}$, Integer

$$P_{30} = 32$$

⑨ Range = largest - Smallest Value

$$R = 57 - 22$$

$$R = 35$$

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

$$= \frac{42 - 32}{2}$$

$$\text{Q.D} = 5$$

$$\text{Skewness} = \frac{\text{Mean} - \text{mode}}{\text{S.D}}$$

$$= \frac{36.8 - 37}{7.41}$$

$$= \frac{-0.20}{7.41}$$

$$\boxed{\text{Skewness} = -0.03}$$

(12) Coefficient Variation (C.V)

$$= \frac{\text{S.D}}{\bar{x}} \times 100$$

$$= \frac{7.41 \times 100}{36.8}$$

$$\boxed{\text{C.V} = 20.14}$$

(13) Mean Deviation = $\sum_{i=1}^n \frac{|x - \bar{x}|}{n}$

$$= \frac{136.40}{25}$$

$$\boxed{\text{M.D} = 5.46}$$

(13)

(14)

$$\text{variance} = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

$$= \frac{1172.12}{25}$$

$$\text{variance} = 46.88$$

(15)

$$\text{S.D} = \sqrt{\text{variance}}$$

$$= \sqrt{46.88}$$

$$\text{S.D} = 6.85$$

Q no 3 End
