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①

Q1a -

$$\text{Mean Consumption of Fresh Vegetables for Men} = \frac{204 + 259 + 266 + 317}{4}$$

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

$$= 261.5 \text{ grams per day}$$

$$\text{Mean Consumption of Fruits for Men} = \frac{31 + 45 + 69 + 105}{4}$$

$$= \frac{250}{4}$$

$$= 62.5 \text{ per gram}$$

(2)

$$\begin{aligned} \text{Mean Consumption} \\ \text{of Rice for men} &= \frac{367 + 337 + 269 + 246}{4} \\ &= \frac{1219}{4} \\ &= 304.75 \text{ grams Per day} \end{aligned}$$

$$\begin{aligned} \text{Mean Consumption} \\ \text{of Fish for men} &= \frac{23 + 28 + 31 + 44}{4} \\ &= \frac{126}{4} \\ &= 31.5 \text{ grams Per day} \end{aligned}$$

$$\begin{aligned} \text{Mean Consumption} \\ \text{of Meat for men} &= \frac{70 + 61 + 69 + 77}{4} \\ &= \frac{277}{4} \\ &= 69.25 \text{ grams Per day} \end{aligned}$$

Women

(3)

$$\text{Mean Consumption of vegetables for women} = \frac{178 + 235 + 266 + 304}{4}$$

$$= \frac{983}{4}$$

$$= 245.75 \text{ grams Per day}$$

$$\text{Mean Consumption of fruits for women} = \frac{2246 + 70 + 131}{4}$$

$$= \frac{265}{4}$$

$$= 66.25 \text{ grams Per day}$$

$$\text{Mean Consumption of rice for women} = \frac{315 + 276 + 243 + 220}{4}$$

$$= \frac{1054}{4}$$

$$= 263.5 \text{ grams Per day}$$

(4)

Mean Consumption of

$$\text{fish for women} = \frac{19 + 21 + 28 + 46}{4}$$

$$= \frac{114}{4}$$

$$= 28.5 \text{ grams Per day}$$

Mean Consumption of

$$\text{meat for women} = \frac{48 + 43 + 54 + 63}{4}$$

$$= \frac{208}{4}$$

$$= 52 \text{ grams Per day}$$

(5)

The Standard deviation
in each case

Standard deviation
in vegetables (men) = $\sqrt{\frac{\sum (204 - 261.5)^2 + (259 - 261.5)^2 + (266 - 261.5)^2 + (317 - 261.5)^2}{4}}$

$$= \sqrt{\frac{\sum (-57.5)^2 + (-2.5)^2 + (4.5)^2 + (55.5)^2}{4}}$$

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

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

$$= \sqrt{1603.25}$$

$$= 40.04 \text{ Per gram}$$

S.D in
vegetable
Per gram for
men.

②

$$\text{S.D of } \text{tree} \text{ for (men)} = \sqrt{\frac{\sum (367 - 304.75)^2 (337 - 304.75)^2 + (269 - 304.75)^2 + (246 - 304.75)^2}{4}}$$

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

$$= \sqrt{\frac{\sum (3875.06) + (1040.062) + (1078.062) + (3451.5625)}{4}}$$

$$= \sqrt{\frac{9644.7465}{4}}$$

$$= \sqrt{2411.186625}$$

$$\text{S.D of tree} = 49.1$$

(8)

$$\text{S.D of Fish (Ten) Consumption} = \sqrt{\frac{\sum (23-31.5)^2 + (28-31.5)^2 + (31-31.5)^2 + (44-31.5)^2}{4}}$$

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

$$= \sqrt{\frac{\sum (72.25 + 12.25 + 0.25 + 156.25)}{4}}$$

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

$$= \sqrt{60.25}$$

$$\text{S.D} = 7.762$$

of
Fish
Consumption

(9)

$$\text{S.D of Heat Consumption (Per)} = \sqrt{\frac{\Sigma (70-69.25)^2 + (61-69.25)^2 + (69-69.25)^2 + (77-69.25)^2}{4}}$$

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

$$= \sqrt{\frac{0.5625 + 68.0625 + 68.0625 + 60.0625}{4}}$$

$$= \sqrt{\frac{196.75}{4}}$$

$$= \sqrt{49.1875}$$

$$\text{S.D of Heat Consumption (Per)} = 7.013$$

women

(10)

$$\text{S.D of fresh vegetables (women) Consumption} = \sqrt{\frac{\sum (235 - 245.75)^2 + (178 - 245.75)^2 + (266 - 245.75)^2 + (304 - 245.75)^2}{4}}$$

$$= \sqrt{\frac{\sum (-10.75)^2 + (-67.75)^2 + (20.25)^2 + (58.25)^2}{4}}$$

$$= \sqrt{\frac{\sum \{ (115.5625)^2 + (4590.0625) + (420.0625) + (3393.0625) \}}{4}}$$

$$= \sqrt{\frac{8508.75}{4}}$$

$$= \sqrt{2127.1875}$$

S.D of = 46.12
fresh vegetables
(women) Consumption

(11)

S.D of
Consumption
of fruits
women

$$= \sqrt{\frac{\sum (28 - 66.25)^2 + (66 - 66.25)^2 + (70 - 66.25)^2 + (121 - 66.25)^2}{4}}$$

$$= \sqrt{\frac{\sum (-38.25)^2 + (-20.25)^2 + (3.75)^2 + (54.75)^2}{4}}$$

$$= \sqrt{\frac{(1463.06) + (410.0625) + (14.0625) + (2997.5625)}{4}}$$

$$= \sqrt{\frac{4884.7475}{4}}$$

$$= \sqrt{1221.18}$$

S.D of = 34.945

Consumption
for fruits
women

3.1

(15)

Mean Consumption

of rice (women)

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

$$= \sqrt{\frac{\sum (52.5)^2 + (12.5)^2 + (-20.5)^2 + (-43.5)^2}{4}}$$

$$= \sqrt{\frac{\sum (2652.25) + (156.25) + (420.25) + (1892.25)}{4}}$$

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

$$= \sqrt{1280.25}$$

$$\text{SD of mean} = 35.78$$

Consumption of
rice

(13)

S.D of mean
Consumption of
fruits

$$= \sqrt{\frac{\Sigma(19-28.5)^2 + (21-28.5)^2 + (28-28.5)^2 + (46-28.5)^2}{4}}$$

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

$$= \sqrt{\frac{\Sigma(90.25 + 56.25 + 0.25 + 306.25)}{4}}$$

$$= \sqrt{\frac{453}{4}}$$

$$= \sqrt{113.25}$$

S.D of
mean
consumption
of fruits = 10.64

(14)

S.D of
mean

Consumption
of Mean

$$= \sqrt{\frac{\sum (48-52)^2 + (43-52)^2 + (54-52)^2 + (63-52)^2}{4}}$$

$$= \sqrt{\frac{\sum (-4)^2 + (-9)^2 + (2)^2 + (11)^2}{4}}$$

$$= \sqrt{\frac{\sum (16 + 81 + 4 + 121)}{4}}$$

$$= \sqrt{\frac{222}{4}}$$

$$= \sqrt{55.5}$$

S.D of = 7.4

mean

Consumption
of meat

(15)

Overall Consumption Mean.

$$\begin{aligned} \text{Mean Consumption} \\ \text{of fresh vegetables} \\ \text{(Men \& women)} &= \frac{204 + 259 + 266 + 317 + 178 + 235 + 266 + 304}{8} \end{aligned}$$

$$= \frac{2029}{8}$$

$$= 253.625$$

$$\begin{aligned} \text{Mean Consumption} \\ \text{of rice} \\ \text{(Men \& women)} &= \frac{347 + 337 + 269 + 246 + 315 + 276 + 243 + 290}{8} \end{aligned}$$

$$= \frac{2273}{8}$$

$$= 284.125$$

16

Mean Consumption
of fish
(Men & women) = $\frac{23+28+31+44+19+21+28+46}{8}$

$$= \frac{240}{8}$$
$$= 30$$

Mean Consumption
of meat
(Men & women) = $\frac{70+61+69+77+48+43+54+63}{8}$

$$= \frac{485}{8}$$
$$= 60.625$$

Part - b .

(17)

Milk Consumption indicates that the group consuming more milk is likely to have a good metabolism in case of both male and female and show that it related to all other consumptions

Root Fresh vegetable Consumption shows that in both gender and shows that those who consume more vegetables have a good metabolism than that of other because their bodies are at good health.

wheat flour Consumption Similarly indicate the same.

these three overall shows that those who tend to eat natural food are good at consuming all other items as their metabolism is good because of that.

Part c -

The distinctive pattern in fish is that the men consumption of fish is decreasing slowly from Q_1 to Q_4 while for females it decreases very sharply.

The Rice consumption from Q_1 to Q_2 increases the same for both men and women, from Q_2 to Q_3 men have a higher consumption related to women and from Q_3 to Q_4 than women have higher consumption.

The fruit consumption from Q_1 to Q_2 shows a sharp decrease for women instead of men, than from Q_2 to Q_3 it is the same than Q_3 to Q_4 men have the lead.

e) Men require ⁽¹⁹⁾ on the average about 20% more food per day than women.

Ans: Divide men figure of main food groups by 1.2 and multiply women figures by 1.2 to obtain.

| | Men | women |
|-----------------|-----|-------|
| Fresh vegetable | 170 | 178 |
| Fruit | 28 | 28 |
| Rice | 306 | 315 |
| wheat flour | 66 | 56 |
| Meat | 58 | 48 |
| Fish | 19 | 19 |

There is not very large differences in the Pattern Consumption but men eat more meat and wheat flour while women eat more fresh vegetable, fruit and so.

(f) Explain in your own words what the standard deviation is better for men and for women.

Men

women

- $0.9 \times \sqrt{1308} = 32.5$
- $0.5 \times \sqrt{1308} = 18.0$
- $1.0 \times \sqrt{1308} = 36.1$
- $1.0 \times \sqrt{1308} = 36.1$
- $0.1 \times \sqrt{1308} = 3.61$
- $0.1 \times \sqrt{1308} = 3.61$
- $0.4 \times \sqrt{1308} = 14.$
- $0.2 \times \sqrt{1308} = 7.2$
- $0.3 \times \sqrt{1308} = 10.8$

- $0.8 \times \sqrt{1540} = 31.4$
- $0.4 \times \sqrt{1540} = 15.69$
- $0.4 \times \sqrt{1540} = 15.69$
- $0.8 \times \sqrt{1540} = 31.4$
- $0.8 \times \sqrt{1540} = 31.4$
- $0.1 \times \sqrt{1540} = 39.24$
- $0.1 \times \sqrt{1540} = 39.24$
- $0.3 \times \sqrt{1540} = 11.77$
- $0.2 \times \sqrt{1540} = 7.84$
- $0.3 \times \sqrt{1540} = 11.77$

16.92

235.84

So the standard deviation of the men of all commodities are the best from the standard deviation of the women.

(1)

Question (2)

(a) The Purpose of a census is to enumerate, and collect data on, every member of a population. The census is a snapshot whereas various administrative records span continuous time and would have to be analysed, with some difficulty, to get a spot figure of a particular date.

(b) It differs from a sample survey in that, by definition, a sample survey does not attempt to reach the whole population. A census will differ from records held by government departments in that it aims to be complete whereas government records will not be.

Also it addresses particular questions (e.g. language, religion) which government records are unlikely to

Contain and ² Participation in the Census is a legal requirement.

③ A Participation of 94% is high and to that extent might be regarded as giving very good information when compared with other data. However, the nature of the missing bit is an issue. The people are likely to be untypical of 94% who participate.

E.g. estimating the homeless rate from the 94% coached would be very inaccurate.

④ Since Ted's Knight is not any real sense a religion this indicates that people do not always take the Census seriously this may therefore cast doubt on accuracy of other response they give. It may also indicate a contempt for, or a distrust of, government and the way it is run.

③
while the example indicates that not all responses can be taken seriously, they may still be valuable in asking questions

④ Conducting the Census online in 2021 will present problems for excluded groups those without internet access or with limited capability such as those in poverty and the old.

⑤ Additional information held by government agencies is unlikely to complete record matching in combining database is a notorious problem

①

Q (3) (a)

Find A.M

| Rainfall (inches) | No. of Years | X | fX | log x _i | f log x _i |
|-------------------|-----------------|----|-------------------|--------------------|------------------------------|
| 20 — 24 | 1 | 22 | 22 | 1.342 | 1.342 |
| 25 — 29 | 3 | 27 | 81 | 1.43 | 4.29 |
| 30 — 34 | 5 | 32 | 160 | 1.50 | 7.5 |
| 35 — 39 | 8 | 37 | 296 | 1.56 | 12.48 |
| 40 — 44 | 5 | 42 | 210 | 1.62 | 8.1 |
| 45 — 49 | 2 | 47 | 94 | 1.67 | 3.34 |
| 50 — 54 | 0 | 52 | 0 | 1.71 | 0 |
| 55 — 59 | 1 | 57 | 57 | 1.75 | 1.75 |
| | $\Sigma f = 25$ | | $\Sigma fX = 920$ | | $\Sigma f \log x_i = 38.802$ |

Arithmetic Mean = $\frac{\Sigma fX}{\Sigma f}$

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

$$= 36.8$$

log Geometric Mean = $\frac{1}{\Sigma f_i} \Sigma f_i \log x_i = \frac{38.802}{25}$

$$\log G.M = 1.55208$$

Taking antilog

$$\text{Antilog} (\log G.M) = \text{Antilog} (1.55208) = 0.4395$$

(2)

Harmonic Mean

| x_i | f_i | f_i/x_i |
|-------------------|-------|--|
| 22 | 1 | 0.045 |
| 27 | 3 | 0.111 |
| 32 | 5 | 0.156 |
| 37 | 8 | 0.21 |
| 42 | 5 | 0.11 |
| 47 | 2 | 0.042 |
| 52 | 0 | 0 |
| 57 | 1 | 0.0175 |
| $\Sigma f_i = 25$ | | $\frac{\Sigma f_i}{\Sigma x_i} = 0.6915$ |

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

$$= \frac{25}{0.6915}$$

$$H.M = 36.153$$

Median

| Rainfall (inches) | f | Cf | C.D |
|-------------------|---|----|-------------|
| 20 — 24 | 1 | 1 | 19.5 — 24.5 |
| 25 — 29 | 3 | 4 | 24.5 — 29.5 |
| 30 — 34 | 5 | 9 | 29.5 — 34.5 |
| 35 — 39 | 8 | 17 | 34.5 — 39.5 |
| 40 — 44 | 5 | 22 | 39.5 — 44.5 |
| 45 — 49 | 2 | 24 | 44.5 — 49.5 |
| 50 — 54 | 0 | 24 | 49.5 — 54.5 |
| 55 — 59 | 1 | 25 | 54.5 — 59.5 |

$$\Sigma f = 25$$

we have to find

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

$$\text{Median} = \frac{n}{2} = \frac{25}{2} = 12.5^{\text{th}}$$

$$l = 34.5, \quad h = 5, \quad f = 8, \quad cf = 9,$$

$$n = 25$$

$$\text{Median} = 34.5 + \frac{5}{8} \left(\frac{25}{2} - 9 \right)$$

$$\text{Median} = 34.5 + 1 (12.5 - 9)$$

$$\text{Median} = 34.5 + 3.5 = 38$$

(4)

$$f_{\text{mode}} = \frac{l + f_m - f_0}{2f_m - f_0 - f_1} \times h$$

$$l = 34.5, \quad f_m = 12, \quad f_0 = 5$$

$$h = 5, \quad f_1 = 5$$

$$f_{\text{mode}} = 34.5 + \frac{12 - 5}{2 \times 12 - 5 - 5} \times 5$$

$$= 34.5 + \frac{7}{24 - 5 - 5} \times 5$$

$$= 34.5 + \frac{7}{19 - 5} \times 5$$

$$= 34.5 + \frac{7}{14} \times 5$$

$$= 34.5 + 0.5 \times 5$$

$$= 34.5 + 2.5$$

$$f_{\text{mode}} = 37$$

Quartile

| Rainfall (inches) | f | cf |
|-------------------|---|----|
| 20-24 | 1 | 1 |
| 25-29 | 3 | 4 |
| 30-34 | 5 | 9 |
| 35-39 | 8 | 17 |
| 40-44 | 5 | 22 |
| 45-49 | 2 | 24 |
| 50-54 | 0 | 24 |
| 55-59 | 1 | 25 |

$$n=25$$

$$Q_3 = \left(\frac{3n^{\text{th}}}{4} \right) = \left(\frac{3 \times 25}{4} \right) = \frac{75}{4} = 18.75$$

Class 40-44

$$Q_3 = L + \frac{\frac{3n}{4} - CF}{f} \cdot C$$

$$= 40 + \frac{18.7 - 7}{5} \cdot 5$$

$$Q_3 = 51.7$$

$$Q_2 = \left(\frac{2n^{\text{th}}}{4} \right) \quad (6)$$

$$Q_2 = \left(\frac{2 \times 25}{4} \right) = \frac{50}{4} = 12.5$$

35-39 — class

$$Q_2 = L + \frac{\frac{2n}{4} - Cf}{f} \cdot C$$
$$= 35 + \frac{12.5 - 9}{8} \cdot 8$$

$$Q_2 = 35 + 3 \cdot 5$$

$$Q_2 = 38.5$$

$$Q_1 = \left(\frac{n^{\text{th}}}{4} \right) = \frac{25}{4} = 6.25$$

Q₁ group 30-34

$$Q_1 = L + \frac{\frac{n}{4} - Cf}{f} \cdot C$$
$$= 30 + \frac{6.25 - 4}{5} \cdot 5$$

$$Q_1 = 30 + 2 \cdot 2.5$$

$$Q_1 = 32.5$$

⑦
Deciles (Finding D_1 & D_{10})

$$D_1 = \frac{1n}{10} = \frac{25}{10} = 2.5$$

$$D_1 = L + \frac{\frac{n}{10} - Cf}{f} \cdot c$$

$$D_1 = 25 + \frac{2.5 - 1}{3} \cdot 3$$

$$= 25 + 1.5$$

$$D_1 = 26.5$$

$$D_{10} = ?$$

$$D_{10} = \frac{10n}{10} = \frac{10 \times 25}{10} = 25$$

$$D_{10} = 55 + \frac{25 - 24}{1} \cdot 1$$

$$= 55 + \frac{1}{1} \cdot 1$$

$$D_{10} = 55 + 1$$

$$D_{10} = 56$$

⑧ Percentiles (finding for P_{10} and P_{99})

$$P_{10} = \left(\frac{10 \times 25}{100} \right) = \frac{250}{100} = 2.5$$

$$P_{10} = L + \frac{\frac{10n}{100} - cf}{f} \cdot c$$

$$P_{10} = 25 + \frac{2.5 - 1}{3} \cdot 3$$

$$= 25 + 1.5$$

$$P_{10} = 26.5$$

$$P_{99} = ?$$

$$P_{99} = \left(\frac{99 \times 25}{100} \right) = \frac{2475}{100} = 24.75$$

$$P_{99} = L + \frac{\frac{99n}{100} - cf}{f} \cdot c$$

$$= 55 + \frac{24.75 - 24}{1} \cdot 1$$

$$= 55 + \frac{.75}{1} \cdot 1$$

$$= 55 + 0.75$$

$$P_{99} = 55.75$$

⑨
Quartile deviation :

$$Q_d = \frac{Q_3 - Q_1}{2}$$

$$= \frac{51.7 - 32.25}{2}$$

$$= \frac{19.45}{2}$$

$$Q_d = 9.725$$

(10)

Mean Deviation

| Rainfall | X_i | $ X - U $ |
|------------------|-------|-----------------------|
| 20-24 | 22 | -14.8 |
| 25-29 | 27 | -9.8 |
| 30-34 | 32 | -4.8 |
| 35-39 | 37 | 0.2 |
| 40-44 | 42 | 5.2 |
| 45-49 | 47 | 10.2 |
| 50-54 | 52 | 15.2 |
| 55-59 | 57 | 20.2 |
| $\sum X_i = 368$ | | $\sum X - U = 21.6$ |

$$\begin{aligned} \text{Mean Deviation} &= \frac{\sum |X - U|}{N} \\ &= \frac{21.6}{8} \end{aligned}$$

Mean Deviation 2.7

(11)
Range 8

| Rainfall (inches) | f | Boundaries | Real Point |
|-------------------|---|-------------|------------|
| 20—24 | 1 | 19.5 — 24.5 | 22 |
| 25—29 | 3 | 24.5 — 29.5 | 27 |
| 30—34 | 5 | 29.5 — 34.5 | 32 |
| 35—39 | 8 | 34.5 — 39.5 | 37 |
| 40—44 | 5 | 39.5 — 44.5 | 42 |
| 45—49 | 2 | 44.5 — 49.5 | 47 |
| 50—54 | 0 | 49.5 — 54.5 | 52 |
| 55—59 | 1 | 54.5 — 59.5 | 57 |

$$\text{Range} = x_x - x_0$$

$$= 57 - 22$$

$$\text{Range} = 35$$

Variance

| Rainfall | f_x | X_1 | $X - \bar{X}$ | $(X - X_1)^2$ |
|----------|-------|-------|---------------|-------------------------------|
| 20-24 | 1 | 22 | -14.8 | 219.04 |
| 25-29 | 3 | 27 | -9.8 | 96.04 |
| 30-34 | 5 | 32 | -4.8 | 23.04 |
| 35-39 | 8 | 37 | 0.2 | 0.04 |
| 40-45 | 5 | 42 | 5.8 | 33.64 |
| 45-49 | 2 | 47 | 10.2 | 104.04 |
| 50-54 | 0 | 52 | 15.2 | 231.04 |
| 55-59 | 1 | 57 | 20.2 | 408.04 |
| | | | | $\Sigma(X - X_1)^2 = 1115.28$ |

$$\text{Mean} = 36.8$$

$$\text{Variance} = \frac{\Sigma(X - X_1)^2}{n}$$

$$= \frac{1115.28}{8}$$

$$\text{Variance} = 139.41$$

Standard ⁽¹³⁾ deviation

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

$$S.D = \sqrt{139.41}$$

$$S.D = 11.807$$

(14)

Co-efficient of variation

$$C.V = \frac{\sigma}{\mu}$$

σ = standard deviation

μ = Mean

$$C.V = \frac{11.807}{36.8}$$

$$C.V = 0.3208$$

Part-b

(1)

Convert the above given data in the form of ungrouped and then find.

20, 25, 26, 29, 30, 31, 32, 33, 34, 35, 36,
37, 37, 37, 37, 38, 39, 40, 41, 42, 43, 44,
45, 49, 55.

Arithmetic Mean =
$$\frac{20+25+26+29+30+31+32+33+34+35+36+37+37+37+37+38+39+40+41+42+43+44+45+49+55}{25}$$

$$= \frac{915}{25}$$

$$A.M = 36.6$$

Geometric Mean =
$$25 \sqrt[25]{20 \times 25 \times 26 \times 29 \times 30 \times 31 \times 32 \times 33 \times 34 \times 35 \times 36 \times 37 \times 37 \times 37 \times 37 \times 38 \times 39 \times 40 \times 41 \times 42 \times 43 \times 44 \times 45 \times 49 \times 55}$$

=

(2)

$$\text{Median} = 37$$

$$\text{Mode} = 37$$

$$\text{Harmonic Mean} = \frac{\sum f}{\sum f/x}$$

$$= \frac{25}{\sum 25/36.6}$$

$$= \frac{25}{6.683}$$

$$\text{Harmonic Mean} = 36.6$$

$$\text{Quartile 1} = \frac{1n}{4} = \frac{25}{4} = 6.25 = 31$$

$$\text{Quartile 2} = \frac{2n}{4} = \frac{50}{4} = 12.5 = 37$$

$$\text{Quartile 3} = \frac{3n}{4} = \frac{3 \times 25}{4} = 18.7 = 41$$

(3)

$$\text{Decile } 1 = \frac{1n}{10} = \frac{25}{10} = 2.5 \approx 3 = 26$$

$$\text{Decile } 5 = \frac{5n}{10} = \frac{5 \times 25}{10} = \frac{125}{10} = 12.5 \approx 13 = 37$$

$$\text{Decile } 9 = \frac{9n}{10} = \frac{9 \times 25}{10} = \frac{225}{10} = 22.5 \approx 23 = 45$$

$$\text{Percentile } 1 = \frac{1n}{100} = \frac{25}{100} = 0.25 = 20$$

$$\text{Percentile } 50 = \frac{50 \times n}{100} = \frac{50 \times 25}{100} = 12.5 \approx 13 = 37$$

$$\text{Percentile } 99 = \frac{99n}{100} = \frac{99 \times 25}{100} = 24.75 = 55$$

(4)

$$\text{Range} = \text{Maximum} - \text{Minimum}$$

$$= 55 - 20$$

$$\text{Range} = 35$$

$$\text{Quartile Deviation} = \frac{Q_3 - Q_1}{2}$$

$$= \frac{41 - 31}{2}$$

$$= \frac{10}{2}$$

$$\text{Quartile deviation} = 5$$

(5)

Variance =

$$\text{Mean} = 36.6$$

$$\begin{aligned} \text{Variance} = & \sum (20-36.6)^2 + (25-36.6)^2 + (26-36.6)^2 + \\ & (29-36.6)^2 + (30-36.6)^2 + (31-36.6)^2 + \\ & (32-36.6)^2 + (33-36.6)^2 + (34-36.6)^2 \\ & + (35-36.6)^2 + (36-36.6)^2 + (37-36.6)^2 \\ & + (37-36.6)^2 + (37-36.6)^2 + (37-36.6)^2 \\ & + (38-36.6)^2 + (39-36.6)^2 + (40-36.6)^2 \\ & + (41-36.6)^2 + (42-36.6)^2 + (43-36.6)^2 \\ & + (44-36.6)^2 + (45-36.6)^2 + (49-36.6)^2 + \\ & (55-36.6)^2 \end{aligned}$$

25

$$\begin{aligned} = & 275.56 + 134.56 + 112.36 + 57.76 + \\ & 43.56 + 31.36 + 21.16 + 0.36 + 6.76 \\ & + 2.56 + 0.36 + 0.16 + 0.16 + 0.16 + \\ & 0.16 + 1.96 + 5.76 + 11.56 + 19.36 + \\ & 29.16 + 40.96 + 54.76 + 70.56 + \\ & 153.76 + 338.56 \end{aligned}$$

25

$$\text{Variance } \frac{14134}{25} = 56.536$$

⑥

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

$$= \sqrt{56.536}$$

$$\text{S.D} = 7.519$$

Coefficient of

$$\text{variation} = \frac{\text{S.D}}{\mu}$$

$$= \frac{7.519}{36.6}$$

$$= 0.205$$