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Assignment = Biostat

Q1: Part(a)

Calculate the overall mean consumption of fresh vegetables, fruits, rice, fish, and meat for women separately. Give the underlying standard deviation in each case. Calculate also the overall mean consumption of fresh vegetable, rice, fish and meat for men and women combined.

Solution:

Mean of fresh vegetables:

$$\text{Men: } \frac{204 + 259 + 266 + 317}{4}$$

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

$$\boxed{\text{Men} = 261.5}$$

$$\text{Women} = \frac{178 + 235 + 266 + 304}{4}$$

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

$$\boxed{\text{Women} = 245.75}$$

Mean of fruits:

$$\text{Men} = \frac{31 + 45 + 69 + 105}{4}$$

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

$$\boxed{\text{Men} = 62.5}$$

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$$\begin{aligned}\text{Women} &= \frac{28 + 46 + 70 + 121}{4} \\ &= \frac{265}{4}\end{aligned}$$

$$\boxed{\text{Women} = 66.25}$$

Mean of rice:

$$\begin{aligned}\text{Men} &= \frac{367 + 337 + 269 + 246}{4} \\ &= \frac{1219}{4}\end{aligned}$$

$$\boxed{\text{Men} = 304.75}$$

$$\begin{aligned}\text{Women} &= \frac{315 + 276 + 220}{4} \\ &= \frac{1054}{4}\end{aligned}$$

$$\boxed{\text{Women} = 263.5}$$

Mean of fish:

$$\begin{aligned}\text{Men} &= \frac{23 + 28 + 31 + 44}{4} \\ &= \frac{126}{4}\end{aligned}$$

$$\boxed{\text{Men} = 31.5}$$

$$\begin{aligned}\text{Women} &= \frac{19 + 21 + 28 + 46}{4} \\ &= \frac{114}{4}\end{aligned}$$

$$\boxed{\text{Women} = 28.5}$$

Mean of meal:

$$\text{Men} = \frac{70 + 61 + 69 + 77}{4}$$

$$= \frac{277}{4}$$

$$\boxed{\text{Men} = 69.25}$$

$$\text{Women} = \frac{48 + 43 + 54 + 63}{4}$$

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

$$\boxed{\text{Women} = 52}$$

Standard Deviation:

Fresh vegetables:

$$\text{Men} = 0.9 \times \sqrt{1308}$$

$$\boxed{= 32.5}$$

$$\text{Women} = 0.8 \times \sqrt{1540}$$

$$\boxed{= 31.4}$$

Fruits:

$$\text{Men} = 0.5 \times \sqrt{1308}$$

$$\boxed{= 18.1}$$

$$\text{Women} = 0.4 \times \sqrt{1540}$$

$$\boxed{= 15.7}$$

Rice:

$$\text{Men} = 1.0 \times \sqrt{1308}$$

$$= 36.2$$

$$\text{Women} = 0.8 \times \sqrt{1540}$$

$$= 31.2$$

Meat:

$$\text{Men} = 0.4 \times \sqrt{1304}$$

$$= 14.5$$

$$\text{Women} = 0.3 \times \sqrt{1540}$$

$$= 11.8$$

Fish:

$$\text{Men} = 0.2 \times \sqrt{1308}$$

$$= 7.2$$

$$\text{Women} = 0.2 \times \sqrt{1540}$$

$$= 7.8$$

Overall Mean:

$$\text{Overall mean of fresh vegetable} = \frac{(\text{total no of men} \times \text{mean of given food group}) + (\text{total no women} \times \text{mean of food group})}{\text{total no of adult}}$$

$$= \frac{(1308 \times 261.5) + (1540 \times 245.8)}{2848}$$

$$= \frac{342042 + 378532}{2848}$$

$$\text{Overall mean} = 253.01$$

$$\text{Overall mean of fruits} = \frac{(1308 \times 62.5) + (1540 \times 66.5)}{2848}$$

$$= \frac{81750 + 102025}{2848}$$

$$\boxed{\text{Overall mean} = 64.53}$$

$$\text{Overall mean of rice} = \frac{(1308 \times 304.5) + (1540 \times 263.5)}{2848}$$

$$= \frac{398286 + 405790}{2848}$$

$$\boxed{\text{Overall mean} = 282.38}$$

$$\text{Overall mean of fish} = \frac{(1308 \times 31.5) + (1540 \times 28.5)}{2848}$$

$$= \frac{41202 + 43890}{2848}$$

$$\boxed{\text{Overall mean} = 29.87}$$

$$\text{Overall mean of Meat} = \frac{(1308 \times 69.25) + (1540 \times 52)}{2848}$$

$$= \frac{90579 + 80080}{2848}$$

$$\boxed{\text{Overall mean} = 59.92}$$

Part (b)

Describe in words what the figure for milk, root vegetables, wheat flour, consumption indicate.

- * Consumption of milk for both men and women are low in Q_3 and Q_4 but it is sharply rise in Q_1 and Q_2 .
- * Fresh vegetables consumption is very low in Q_3 and Q_4 but it is rise sharply in Q_1 and Q_2 .
- * Consumption of wheat flour for both men and women is very low in Q_3 and Q_4 but it is rise sharply in Q_1 and Q_2 .

Part (c).

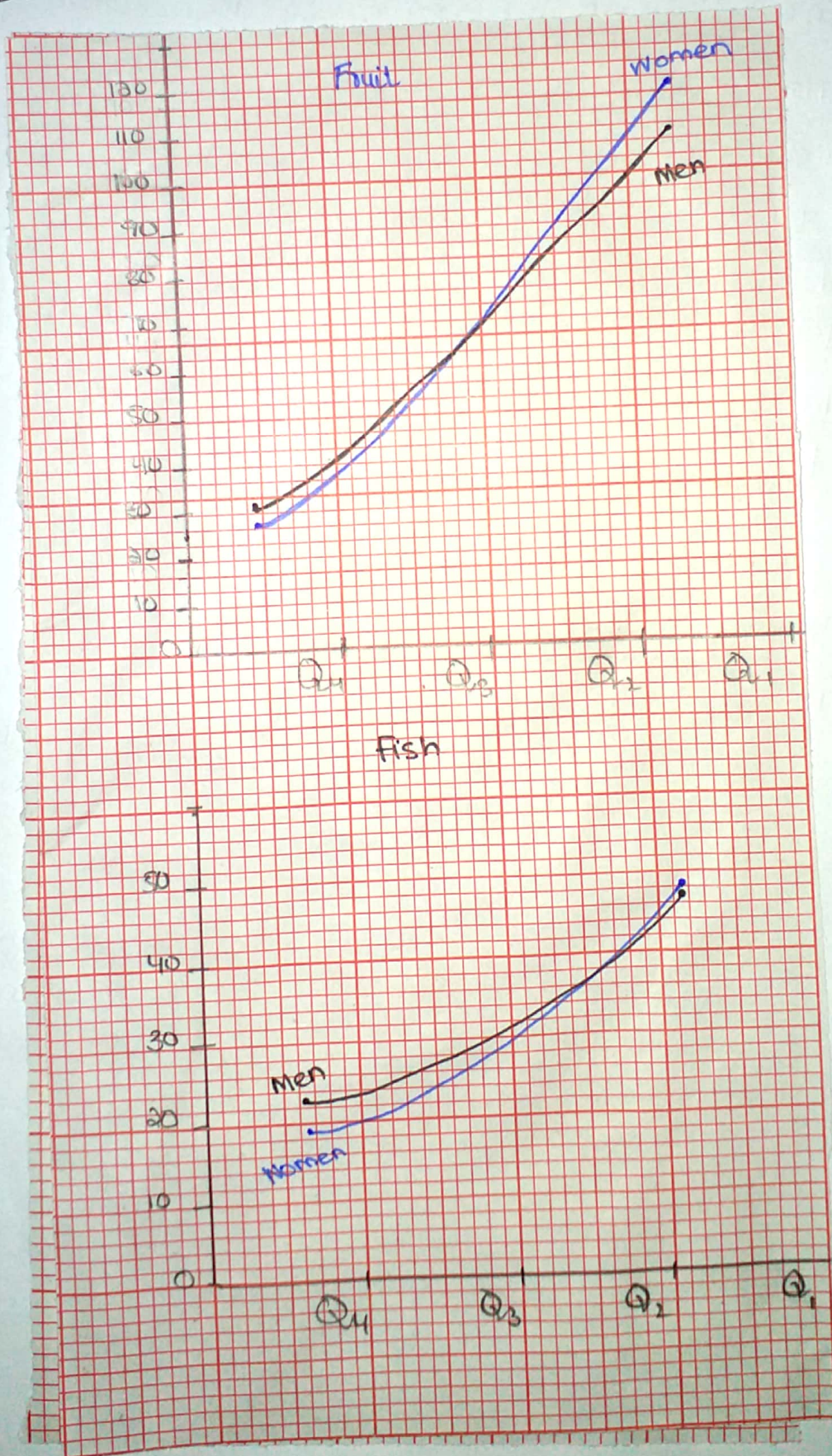
What distinctive pattern is there, for both men and women, in rice, fruit, and fish consumption across the four parts, Q_4 to Q_1 .

- * Consumption of rice fall, for both men and women.
- * Consumption of fruits rises, for both men and women.
- * Consumption of fish also fall, for both men and Women.

Part(d).

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Draw a suitable diagram to show the differences in consumption pattern of fruits, fish between women and men.



Part(e). Men required, on average, about 20% more food per day than women to maintain energy level.

Use the information to compare the consumption of the main food group by men in Q₄ and women Q₁.

Group	Men Q ₄	Women Q ₁
Fresh vega	204	304
Fruit	31	131
Rice	367	202
Wheat flour	79	180
Meat	70	63
Fish	23	48

There are a very large differences in pattern of consumption.

- * Men eat more meat and rice and women eat more fresh vegetables, fruits, wheat flour and fish.

Part(f)

Explain in your words what the standard deviation of the above commodities shows for men and women and which one show better result.

Standard deviation of whole grain and root vegetables for men and women is very less. Therefore whole grain and root vegetable is best results.

Q.2 part(a)

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Describe the purpose of census.

Purpose of census:

- * The main purpose of census are to count the entire population of a country, and location where each people are usually lives.
- * Census is to provide central and local government with the information required for them to target resources and services to meet anticipate need of the population

Part (b)

Explaining how its differ from a sample survey and from routine collection of data by government agencies.

Sample Survey:

It is the process of selecting a sample of element from a target population to conduct survey.

- ⇒ We describe two modern method of survey:
- * The first method is the development of government statistics and census and the general development of statistical methodology especially for valid estimation
 - * The second method is the movement from census to sample survey, examining the debate over representative method and size of

Probability sample.

Routine Collection data:

Routine Collection data:

It is the information you collect from your user habitually.

- ⇒ Routine collection data is widely used for medical research. Extensive resources have been invested in this field;
- * They include the setup of disease registries and clinical data base at regional, national, and international.
 - * Making the wearable devices for the collection of health data.

Part (e)

Discuss the potential problems in conducting the 2021 UK census online, and explain how these problems might overcome.

Problem

Potential Problems:

The potential problems should be faced by UK in 2021 census online are;

- * lower public co-operations and participation.
- * Difficulties in accessing secure apartment and enumerating unsafe area.

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- * If the people of UK do online census all the the Personal information can be hacked by foreign country.
- ⇒ To solve all problems by a shift from traditional census method to greater use of register or printed form.

Q₂ Part(c)

The 2011 UK census attracted a ~~person~~ response rate of about 94% of the population. Discuss whether or not that is a problem for the accuracy of the census.

A participation of 94% is high and might be regarded as giving very good information about the population as compared as other data. The nature of the missing 6% is an issue. Only 94% population people who participate.

Part(d) :-

In the 2011 UK census almost 170,000 people ~~started~~ stated their ~~reg~~ religion as "Jedi knight". Discuss what response of this type indicated about the attitude of this type invalidate asking question religion.

"Jedi knight" indicates that people don't always take the census seriously. There may be still be value in asking the question.

Part(f)

Discuss the potential problems incorporating additional held by government agencies.

Potential Problems:

- * Addition information is held by government agencies is unlikely to be complete.
- * It should be lack of quality control.
- * Missing items or record.
- * Difference in concepts between the program and what the government agencies need.

Group Data:

Classes	f	x	fx	f/x	logx	flogx
20-24	1	22	22	0.045	1.34	1.34
25-29	3	27	81	0.11	1.43	4.29
30-34	5	32	160	0.16	1.51	7.55
35-39	8	37	296	0.22	1.57	12.6
40-44	5	42	210	0.12	1.62	8.1
45-49	2	47	94	0.04	1.67	3.34
50-54	0	52	0	0	1.72	0
55-59	1	57	57	0.02	1.75	1.75
	$\Sigma f = 25$	$\Sigma x = 316$	$\Sigma fx = 920$	$\Sigma f/x = 0.715$		$\Sigma f \log x = 38.97$

$$\Sigma f = 25, \quad \Sigma x = 316, \quad \Sigma fx = 920, \quad \Sigma f/x = 0.715$$

$$\Sigma f \log x = 38.97$$

Find A.M:

As know that.

$$\bar{x} = \frac{\sum_{i=1}^n fx}{\sum f} \rightarrow \textcircled{1}$$

Putting the values in equation $\textcircled{1}$

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

$$\bar{x} = 36.8 \quad \text{Ans}$$

Find H.M:

As know that.

$$H.M = \frac{\sum f}{\sum f/x} \rightarrow \textcircled{1}$$

Putting the values.

$$H.M = \frac{25}{0.715}$$

$$H.M = 35 \text{ Ans}$$

Find G.M:

As we know that

$$G.M = \text{Anti-log} \left(\frac{\sum f \log x}{\sum f} \right) \rightarrow \textcircled{1}$$

Putting the values in equation in $\textcircled{1}$

$$G.M = \text{Antilog} \left(\frac{38.97}{25} \right)$$

$$G.M = \text{Antilog} (1.55)$$

$$G.M = 35.4 \text{ Ans}$$

Class	f	C.f
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
	$\Sigma f = 25$	

Find Median:

As know that

$$\text{Median} = \left(\frac{n}{2} \right)^{\text{th}} \rightarrow \textcircled{1}$$

Putting the values in equation (1):

$$\text{Median} = \frac{25}{2} \Rightarrow 12.5$$

Which is lies in the group of 35-39

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

$$\text{Median} = 35 + \frac{5}{8} (12.5 - 9)$$

$$\text{Median} = 35 + 0.625 (3.5)$$

$$\text{Median} = 35 + 2.18$$

Median = 37

Ans:

Find Mode:

As know that

Mode = l + (fm - fo) / (2fm - fo - fi) x 5

Putting the values in equation

Mode = 35 + (8 - 5) / (2(8) - 5 - 5) x 5

Mode = 35 + 3 / (16 - 10) x 5

Mode = 35 + 15 / 6

Mode = 35 + 2.5

Mode = 37.5

Ans

Find Quartiles:

As know that

Q = ((n+1) / 4)th

Putting the values

Q = (25+1) / 4 => 6.5

Which lies in the group of 30-34

Find Quartile

As we know that

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

Putting the value

$$Q = \frac{25}{4}$$

$$Q = 6.25$$

which lies in the group of 30-34

As we know that

$$Q_1 = l + \frac{h}{f} \left(\frac{n}{4} - C \right)$$

$$Q_1 = 30 + \frac{8}{8} (6.25 - 4)$$

$$Q_1 = 30 + 2.5$$

$$Q_1 = 32.5$$

Similarly

Q_2 is equal to median.

Similarly we know that

$$Q_3 = \frac{3n}{4}$$

$$Q_3 = \frac{3(25)}{4}$$

$$Q_3 = 18.75$$

As we know that

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

$$Q_3 = 40 + \frac{5}{8} (18.5 - 17)$$

$$Q_3 = 40 + (0.5)$$

$$Q_3 = 40 + 0.5$$

$$\boxed{Q_3 = 40.5}$$

To find Decile:

As we know that

$$D = \frac{n}{10} \Rightarrow \frac{25}{10}$$

$$D = 2.5$$

Which lies in the group of
25-29

Using formula.

$$D_1 = l + \frac{h}{f} \left(\frac{n}{10} - c \right)$$

Putting the values.

$$D_1 = 25 + \frac{5}{3} (2.5 - 1)$$

$$D_1 = 25 + 1.67 (1.5)$$

$$D_1 = 25 + 2.5$$

$$D_1 = 27.5 \text{ Ans}$$

Similarly,

$$D_2 = \frac{2n}{10}$$

Putting the values

$$D_2 = \frac{2(25)}{10}$$

$$D_2 = \frac{50}{10} \Rightarrow 5$$

Which lies in the group of 30-34

Using formula

$$D_2 = l + \frac{h}{f} \left(\frac{2n}{2} - c \right)$$

Putting the values:

$$D_2 = 30 + \frac{8}{8} (5 - 4)$$

$$D_2 = 30 + 1(1)$$

$$D_2 = 31 \text{ Ans}$$

Similarly,

$$D_3 = \frac{3n}{10}$$

Putting the values.

$$D_3 = \frac{75}{10} \Rightarrow 7.5$$

Which lies in the group of 35-39

Using formula.

$$D_3 = l + \frac{h}{f} \left(\frac{3n}{10} - c \right)$$

Putting the values.

$$D_3 = 30 + \frac{8}{8} (7.5 - 4)$$

$$D_3 = 33.5 \text{ Ans}$$

Similarly,

$$D_4 = \frac{4(n)}{10}$$

$$D_4 \Rightarrow 10$$

Using formula.

$$D_4 = l + \frac{h}{f} \left(\frac{4n}{10} - c \right)$$

$$D_4 = 35 + \frac{5}{8} (10 - 9)$$

$$D_4 = 35 + 0.62$$

$$D_4 = 35.62$$

Similarly

$$D_5 = \frac{5(n)}{10}$$

$$D_5 = \frac{5(25)}{10} \Rightarrow 12.5$$

Using the formula.

$$D_5 = l + \frac{h}{f} \left(\frac{5n}{10} - c \right)$$

$$D_5 = 35 + \frac{5}{8} (12.5 - 9)$$

$$D_5 = 35 + 0.625 (3.5)$$

$$D_5 = 35 + 2.18$$

$$D_5 = 37.18 \text{ Ans}$$

Similarly

$$D_6 = \frac{6n}{10} \Rightarrow \frac{6(25)}{10}$$

$$D_6 = 15$$

Which lies in the group of 35-39

Using formula

$$D_6 = l + \frac{h}{f} \left(\frac{6n}{10} - c \right)$$

$$D_6 = 35 + \frac{5}{8} (15 - 9)$$

$$D_6 = 35 + 0.625(6)$$

$$D_6 = 38.7 \text{ Ans}$$

Similarly

$$D_7 = \frac{7n}{10} \Rightarrow \frac{7(25)}{10}$$

$$D_7 = \frac{175}{10} \Rightarrow 17.5$$

Which lies in the group of 40-44

Using formula.

$$D_7 = l + \frac{h}{f} \left(\frac{7n}{10} - c \right)$$

$$D_7 = 40 + \frac{8}{8} (17.5 - 17)$$

$$D_7 = 40 + 1(0.5)$$

$$\boxed{D_7 = 40.5}$$

Similarly

$$\boxed{D_8 = \frac{8n}{10}} \Rightarrow \frac{8(25)}{10}$$

$$D_8 = \frac{200}{10} = 20$$

Using the formula

$$\boxed{D_8 = l + \frac{h}{f} \left(\frac{8n}{10} - c \right)}$$

$$D_8 = 40 + \frac{8}{8} (20 - 17)$$

$$D_8 = 40 + 1(3)$$

$$\boxed{D_8 = 43} \text{ Ans}$$

Similarly

$$\boxed{D_9 = \frac{9n}{10}} \Rightarrow \frac{9(25)}{10}$$

$$D_9 = \frac{225}{10} \Rightarrow 22.5$$

Using the formula.

$$\boxed{D_9 = l + \frac{h}{f} \left(\frac{9n}{10} - c \right)}$$

$$D_9 = 45 + \frac{5}{2} (22.5 - 22)$$

$$D_9 = 45 + 2.5(0.5)$$

$$D_9 = 1.25 + 45 \Rightarrow \boxed{D_9 = 46.25}$$

Similarly

$$D_{10} = \frac{10n}{10} \Rightarrow \frac{10(25)}{10}$$

$$D_{10} = \frac{250}{10} \Rightarrow 25.0$$

Using formula.

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

$$D_{10} = 55 + \frac{5}{1} (25 - 24)$$

$$D_{10} = 55 + 5$$

$$D_{10} = 60 \text{ Ans}$$

To find Percentile.

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As we know that

$$P_j = \frac{j^n}{100}$$

$$P_{10} = \frac{10 \times 25}{100} \Rightarrow \frac{250}{100}$$

$$P_{10} = 2.5$$

Using formula.

$$P_{10} = l + \frac{h}{f} \left(\frac{j^n}{100} - C \right)$$

$$P_{10} = 25 + \frac{5}{3} (2.5 - 1)$$

$$P_{10} = 25 + 1.66 (1.5)$$

$$P_{10} = 25 + 2.5$$

$$P_{10} = 27.5$$

Similarly

$$P_{20} = \frac{20n}{100} \Rightarrow \frac{20 \times 25}{100}$$

$$P_{20} = \frac{500}{100} \Rightarrow 5$$

Using formula.

$$P_{20} = l + \frac{h}{f} \left(\frac{20n}{100} - C \right)$$

$$P_{20} = 30 + \frac{8}{8} (5 - 4)$$

$$P_{20} = 30 + 1$$

$$\boxed{P_{20} = 31} \text{ Ans}$$

$$P_{30} = \frac{30n}{100} \Rightarrow \frac{30(25)}{100}$$

$$P_{30} = \frac{750}{100} \Rightarrow 7.5$$

Using formula.

$$\boxed{P_{30} = t + \frac{h}{f} \left(\frac{30n}{100} - e \right)}$$

$$P_{30} = 30 + \frac{5}{5} (7.5 - 4)$$

$$P_{30} = 30 + 3.5$$

$$P_{30} = 30 + 3.5$$

$$\boxed{P_{30} = 33.5}$$

Similarly

$$\boxed{P_{45} = \frac{45n}{100}} \Rightarrow \frac{45(25)}{100}$$

$$P_{45} = 11.25$$

Using formula.

$$P_{45} = 35 + \frac{5}{8} (11.25 - 9)$$

$$P_{45} = 35 + 0.625(2.5)$$

$$P_{45} = 35 + 1.56$$

$$\boxed{P_{45} = 36.15} \text{ Ans.}$$

Similarly

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$$P_{55} = \frac{55(25)}{100} \Rightarrow \frac{1375}{100}$$

$$P_{55} = 13.75$$

Using formula.

$$P_{55} = l + \frac{h}{f} \left(\frac{55n}{100} - c \right)$$

$$P_{55} = 35 + \frac{5}{8} (13.75 - 9)$$

$$P_{55} = 35 + 0.625(4.75)$$

$$P_{55} = 35 + 2.96$$

$$P_{55} = 37.96 \quad \text{Ans}$$

Similarly

$$P_{85} = \frac{85n}{100} \Rightarrow \frac{85(25)}{100}$$

$$P_{85} = \frac{2125}{100} \Rightarrow 21.25$$

Where lies in the group of 40-44

$$P_{85} = l + \frac{h}{f} \left(\frac{85n}{100} - c \right)$$

$$P_{85} = 40 + \frac{5}{8} (21.25 - 17)$$

$$P_{85} = 40 + 4.25$$

$$P_{85} = 44.25$$

Similarly

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$$P_{90} = \frac{90n}{100} \Rightarrow \frac{90(25)}{100}$$

$$P_{90} = \frac{2250}{100} \Rightarrow 22.5$$

Using formula.

$$P_{90} = l + \frac{h}{f} \left(\frac{90n}{100} - c \right)$$

$$P_{90} = 45 + \frac{5}{2} (22.5 - 22)$$

$$P_{90} = 45 + 2.5(0.5)$$

$$P_{90} = 45 + 1.25$$

$$P_{90} = 46.25 \text{ Ans.}$$

Find Range:

As we know that.

$$R = X_m - X_o$$

$$X_{\max} = 59$$

$$X_o = 20$$

Putting the values.

$$R = 59 - 20$$

$$R = 39 \text{ Ans}$$

Find Mean Deviation

Classes	x	f	$(x-x)$	$(x-x)^2$	$f(x-x)$	$f(x-x)^2$
20-24	22	1	-14.8	219.04	-14.8	219.04
25-29	27	3	-9.8	96.04	-29.4	288.12
30-34	32	5	-4.8	23.04	-24	115.2
35-39	37	8	0.2	0.04	1.6	0.32
40-44	42	5	5.2	27.04	26	135.2
45-49	47	2	10.2	104.04	20.4	208.08
50-54	52	0	15.2	231.04	0	0
55-59	57	1	20.2	408.04	20.4	408.04
		$\sum f = 25$	$\sum (x-x) = 21.6$		$\sum f(x-x) = 0$	$\sum f(x-x)^2 = 1374$

As we know that

$$\text{Mean} = \bar{x} = \frac{\sum fx}{\sum f}$$

$$\therefore \sum f(x-\bar{x}) = 0$$

$$\therefore \sum f = 25$$

$$\therefore \sum f(x-\bar{x})^2 = 1374$$

Putting the values.

$$\bar{x} = \frac{920}{25} \Rightarrow \boxed{36.8}$$

Then

$$\text{M.D} = \frac{\sum f(x-\bar{x})}{\sum f}$$

Putting the values.

$$\text{M.D} = \frac{0}{25}$$

$$\boxed{\text{M.D} = 0} \text{ Ans}$$

Find Variance:

As we know that

$$S^2 = \frac{\sum f(x - \bar{x})^2}{\sum f - 1}$$

Putting the values -

$$S^2 = \frac{1374}{25-1}$$

$$S^2 = 57.25 \text{ Ans}$$

Find Standard Deviation:

As we know that

$$S = \sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f - 1}}$$

$$S = \sqrt{57.25}$$

$$S = 7.6 \text{ Ans}$$

Find Co-efficient Variation:

As we know that.

$$C.V = \frac{SD}{\bar{x}} \times 100$$

Putting the values.

$$C.V = \frac{7.6}{36.8} \times 100$$

$$C.V = \frac{760}{36.8} \Rightarrow 20.6 \text{ Ans}$$

Find skewness:

As we know that

$$S_k = \frac{\text{mean} - \text{mode}}{\text{SD}}$$

Putting the values.

$$S_k = \frac{36.8 - 37.5}{7.56}$$

$$\boxed{S_k = -0.092} \text{ Ans}$$

Find Quantile Deviation:

As we know that

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

Putting the values.

$$Q.D = \frac{40.5 - 32.5}{2}$$

$$Q.D = \frac{8}{2}$$

$$\boxed{Q.D = 4} \rightarrow \text{Ans}$$

Ungroup Data:

32, 30, 33, 25, 36, 39, 43, 47, 44, 21, 30,
 32, 35, 29, 47, 43, 31, 32, 59, 42, 29
 35, 34, 38, 35.

Arrangement:

21, 25, 29, 30, 31, 32, 33, 34, 35, 35
 36, 37, 38, 39, 41, 42, 43, 44, 47,
 48, 48, 48, 59

Smallest value: 21

Largest value: 59

$L - S$

$$\boxed{59 - 21 = 38}$$

Find A.M.:

$$A.M = \bar{x} = \frac{21 + 25 + 29 + 30 + \dots + 47 + 48 + 59}{20}$$

$$A.M = \bar{x} = \frac{744}{20}$$

$$\bar{x} \Rightarrow \boxed{37.2} \text{ Ans}$$

x	$\log x$	$1/x$
21	1.32	0.047
25	1.39	0.04
29	1.46	0.034
30	1.47	0.033
31	1.49	0.032
32	1.51	0.031
33	1.52	0.030
34	1.53	0.029
35	1.54	0.028
36	1.55	0.027
37	1.57	0.027
38	1.58	0.026
39	1.59	0.025
41	1.61	0.024
42	1.62	0.023
43	1.63	0.023
44	1.64	0.022
47	1.67	0.021
48	1.68	0.020
59	1.77	0.016

$$\sum \log x = 31.14 \quad \sum 1/x = 0.559$$

Find G.M.:

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

$$x_g = \text{Antilog} \left(\frac{31.44}{20} \right)$$

$$x_g = \text{Antilog} (1.55)$$

$$x_g = 35.8 \text{ Ans}$$

Find H.M.:

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

$$H.M = \frac{20}{0.559}$$

$$H.M = 35.7 \text{ Ans}$$

Find Median:

$$\text{median} = \left(\frac{n+1}{2} \right)$$

$$= \frac{20+1}{2}$$

$$\text{Med} = \frac{21}{2} \Rightarrow 10.5 \text{ Ans}$$

Find Mode:

35 which is more repeated than 1.

Find Quartiles:

$$Q = \left(\frac{n+1}{4} \right) \Rightarrow \left(\frac{20+1}{4} \right)$$

$$= 5.2$$

$$Q_1 = 31 + 0.2 (32 - 31)$$

$$Q_1 = 31 + 0.2$$

$$\boxed{Q_1 = 31.2} \text{ Ans}$$

$$Q_2 = \frac{2(n+1)}{4}$$

Putting values

$$2 \left(\frac{20+1}{4} \right) \Rightarrow 10.5$$

$$Q_2 = 36 + 0.5 (37 - 36)$$

$$Q_2 = 36 + 0.5$$

$$\boxed{Q_2 = 36.5} \text{ Ans}$$

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

Putting values.

$$Q_3 = 3 \left(\frac{20+1}{4} \right) \Rightarrow 15.75$$

$$Q_3 = 42 + 0.75 (43 - 42)$$

$$Q_3 = 42 + 0.75$$

$$\boxed{Q_3 = 42.75} \text{ Ans}$$

Find Deciles:

36

$$D_1 = \frac{n+1}{10}$$

$$D_1 = \frac{20+1}{10}$$

$$D_1 = 2.1$$

$$D_1 = 25 + 0.1(29 - 25)$$

$$D_1 = 25 + 0.1(4)$$

$$D_1 = 25 + 0.4$$

$$D_1 = 25.4 \text{ Ans}$$

$$D_2 = 2\left(\frac{n+1}{10}\right)$$

$$D_2 = 4.2$$

$$D_2 = 30 + 0.2(31 - 30)$$

$$D_2 = 30 + 0.2$$

$$D_2 = 30.2 \text{ Ans}$$

$$D_3 = 3\left(\frac{n+1}{10}\right)$$

$$D_3 = 3\left(\frac{21}{10}\right)$$

$$D_3 = 6.3$$

37

$$D_3 = 32 + 0.3(33 - 32)$$

$$D_3 = 32 + 0.3(1)$$

$$\boxed{D_3 = 32.3} \text{ Ans}$$

$$D_4 = 4\left(\frac{n+1}{10}\right)$$

$$D_4 = 4\left(\frac{21}{10}\right)$$

$$= 8.4$$

$$D_4 = 34 + 0.4(35 - 34)$$

$$D_4 = 34 + 0.4$$

$$\boxed{D_4 = 34.04} \text{ Ans}$$

$$D_5 = 5\left(\frac{n+1}{10}\right)$$

$$D_5 = 5\left(\frac{21}{10}\right) = 10.5$$

$$D_5 = 36 + 0.5(37 - 36)$$

$$D_5 = 36 + 0.5$$

$$\boxed{D_5 = 36.5} \text{ Ans.}$$

38

$$D_6 = 6 \left(\frac{n+1}{10} \right)$$

$$D_6 = \frac{126}{10} = 12.6$$

$$D_6 = 38 + 0.6 \quad (39 - 38)$$

$$D_6 = 38 + 0.6$$

$$\boxed{D_6 = 38.6} \text{ Ans}$$

$$D_7 = 7 \left(\frac{n+1}{10} \right)$$

$$D_7 = \left(\frac{147}{10} \right) \Rightarrow 14.7$$

$$D_7 = 41 + 0.7 \quad (42 - 41)$$

$$D_7 = 41 + 0.7$$

$$\boxed{D_7 = 41.7} \text{ Ans}$$

$$D_8 = 8 \left(\frac{n+1}{10} \right)$$

$$D_8 = 8 \left(\frac{21}{10} \right) \Rightarrow \frac{168}{10}$$

$$= 16.8$$

$$D_8 = 43 + 0.8 \quad (44 - 43)$$

$$D_8 = 43 + 0.8$$

39

$$\boxed{D_8 = 43.8}$$

$$D_9 = \frac{9(n+1)}{10}$$

$$D_9 = \frac{9(21)}{10} = \frac{189}{10}$$

$$\boxed{D_9 = 18.9} \text{ Ans}$$

$$D_9 = 47 + 0.9 (48 - 47)$$

$$D_9 = 47 + 0.9$$

$$\boxed{D_9 = 47.9} \text{ Ans}$$

To find Percentile

As we know that

$$* P_{10} = \frac{10(n+1)}{10}$$

$$P_{10} = \frac{10(20+1)}{10}$$

$$P_{10} = 2.1$$

$$P_{10} = 25 + 0.1(29 - 25)$$

$$P_{10} = 25 + 0.1(4)$$

$$P_{10} = 25 + 0.4$$

$$\boxed{P_{10} = 25.4} \text{ Ans}$$

$$* P_{20} = \frac{20(n+1)}{100}$$

Putting the values.

$$P_{20} = \frac{20(21)}{100} \Rightarrow \frac{420}{100}$$

$$P_{20} = 4.2$$

$$P_{20} = 30 + 0.2(31 - 30)$$

$$\boxed{P_{20} = 30.2} \text{ Ans}$$

$$* P_{30} = \frac{30(21)}{100} \Rightarrow \frac{630}{100}$$

$$P_{30} = 6.3$$

$$P_{30} = 32 + 0.3(33 - 32)$$

$$P_{30} = 32 + 0.3$$

$$\boxed{P_{30} = 32.3} \text{ Ans}$$

$$* P_{40} = \frac{40(n+1)}{100}$$

Putting the values

$$P_{40} = \frac{40(21)}{100} \Rightarrow \frac{840}{100}$$

$$P_{40} = \frac{8.4}{10}$$

$$P_{40} = 34 + 0.4(35 - 34)$$

$$P_{40} = 34 + 0.4$$

$$\boxed{P_{40} = 34.04} \text{ Ans}$$

$$* P_{50} = \frac{50(n+1)}{100}$$

$$P_{50} = \frac{50(21)}{100} \Rightarrow \frac{1050}{100}$$

$$P_{50} = 10.5$$

$$P_{50} = 36 + 0.5(37 - 36)$$

$$P_{50} = 36 + 0.5$$

$$\boxed{P_{50} = 36.5} \text{ Ans}$$

$$* P_{60} = \frac{60(n+1)}{100}$$

Putting the values

$$P_{60} = \frac{60(21)}{100} \Rightarrow 12.6$$

$$P_{60} = 38 + 0.6(39 - 38)$$

$$P_{60} = 38 + 0.6$$

$$\boxed{P_{60} = 38.6} \text{ Ans}$$

$$* P_{70} = \frac{70(n+1)}{100}$$

Putting the values

$$P_{70} = \frac{70(21)}{100} \Rightarrow \frac{1470}{100}$$

$$P_{70} = 14.7$$

$$P_{70} = 41 + 0.7(42 - 41)$$

$$\boxed{P_{70} = 41.7} \text{ Ans}$$

$$* P_{80} = \frac{80(n+1)}{100}$$

Putting the values.

$$P_{80} = \frac{80(21)}{100} \Rightarrow \frac{1680}{100}$$

$$P_{80} = 16.8$$

43

$$P_{80} = 43 + 0.8 (44 - 43)$$

$$P_{80} = 43 + 0.8$$

$$\boxed{P_{80} = 43.8} \text{ Ans}$$

$$* P_{85} = \frac{85 (n+1)}{100}$$

Putting the values.

$$P_{85} = \frac{85 (21)}{100} \Rightarrow \frac{1785}{100}$$

$$P_{85} = 17.85$$

$$P_{85} = 44 + 0.85 (48 - 47)$$

$$\boxed{P_{85} = 44.85} \text{ Ans}$$

$$* P_{90} = \frac{90 (n+1)}{100}$$

Putting the values

$$P_{90} = \frac{90 (21)}{100} \Rightarrow \frac{1995}{100}$$

$$P_{90} = 19.95$$

$$P_{90} = 47 + 0.95 (48 - 47)$$

$$P_{90} = 47 + 0.95$$

$$\boxed{P_{90} = 47.95} \text{ Ans}$$

To find Range

As we know that

$$R = X_{\max} - X_{\min}$$

$$X_{\max} = 59$$

$$X_{\min} = 21$$

Putting the values.

$$R = 59 - 21$$

$$R = 38$$

To Find Quartile Deviation

As we know that

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

Putting the values.

$$Q.D = \frac{42.7 - 31.2}{2}$$

$$Q.D = \frac{11.5}{2}$$

$$Q.D = 5.7 \text{ Ans}$$

To Find Mean Deviation:

x	$x - \bar{x}$	$(x - \bar{x})^2$
21	-16.2	262.4
25	-12.2	148.8
29	-8.2	67.2
30	-7.2	51.8
31	-6.2	38.4
32	-5.2	27
33	-4.2	17.6
34	-3.2	10.2
35	-2.2	4.84
36	-1.2	1.44

x	$(x - \bar{x})$	$(x - \bar{x})^2$
37	-0.2	0.04
38	0.8	0.64
39	1.8	3.24
41	3.8	14.4
42	4.8	23
43	5.8	33.64
44	6.8	46.24
47	9.8	96
48	10.8	116.6
59	21.8	475.2
$\sum x = 744$	$\sum (x - \bar{x}) = 0$	$\sum (x - \bar{x})^2 = 1438.6$

$$\therefore \sum x = 744 \quad \sum (x - \bar{x}) = 0 \quad \sum (x - \bar{x})^2 = 1438.6$$

As we know that

$$\frac{\sum x}{n} \Rightarrow \frac{744}{20} \Rightarrow 37.2$$

We also know that

$$M.D = \frac{\sum (x - \bar{x})}{N}$$

Putting the values

$$M.D = \frac{0}{20}$$

$$M.D = 0$$

To find Variance

Using formula

$$S^2 = \frac{\sum(x - \bar{x})^2}{N}$$

Putting the values.

$$S^2 = \frac{1438.6}{20}$$

$$S^2 = 71.9$$

To find Standard Deviation

Using formula

$$S = \sqrt{\frac{\sum(x - \bar{x})^2}{N}}$$

Putting the values

$$S = \sqrt{71.9}$$

$$S = 8.4$$

To find Co-efficient Variation:

Using formula

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

Putting the values

$$C.V = \frac{8.4 \times 100}{37.2} \Rightarrow \frac{840}{37.2}$$

$$C.V = 22.5$$

To Find Skewness:

Using formula

$$S_k = \frac{\text{mean} - \text{mode}}{\text{SD}}$$

Putting the values-

$$S_k = \frac{37.2 - 35}{8.4}$$

$$S_k = \frac{2.2}{8.4}$$

$$S_k = 0.26$$