



BIOSTATISTIC

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QUESTIONS:

QUESTION: 1

The data in the table are taken from a survey of the diet of 1308 men and 1540 women in total 2848 adults in a region of Pakistan. The numbers of men and women surveyed were divided, separately, into four equal parts on the basis of their fresh vegetable consumption. These parts are shown as Q4, Q3, Q2 and Q1. The mean consumption in grams per day is given for each food type in each part, for men and women separately. For example, the mean consumption of fruit by men who ate the lowest amount of fresh vegetables is 31 grams per day. The columns headed SE give the standard errors of the mean food consumptions by all men and all women.

	Men (sample size 1308)					Women (sample size 1540)				
	Q4	Q3	Q2	Q1	SE	Q4	Q3	Q2	Q1	SE
	Mea n	Mea n	Mea n	Mea n		Mea n	Mea n	Mea n	Mea n	
FRESH VEG	204	259	266	317	0. 9	178	178	266	304	0. 8
FRUIT	31	45	69	105	0. 5	28	28	70	121	0. 4

RICE	367	337	269	246	0.1	315	315	243	220	0.8
WHITE FLOUR	79	114	197	253	1.0	56	56	141	180	0.8
WHOLE GRAIN	2	2	6	27	0.1	1	1	6	22	0.1
ROOT VEG	7	11	16	29	0.1	6	6	17	28	0.1
MEAT	70	61	69	77	0.4	48	48	54	63	0.3
FISH	23	28	31	44	0.2	19	19	28	46	0.2
MILK	2	3	23	39	0.3	1	4	15	48	0.3

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

b. Describe in words what the figures for milk, root vegetable, wheat flour, consumption indicate.

c. What distinctive pattern is there, for both men and women, in rice, fruit, and fish consumption across the four parts, Q4 to Q1?

d. Draw a suitable diagram to show the difference in consumption patterns of fish and fruits between men and women.

e. Men require, on average, about 20% more food per day than women to maintain energy levels. Use this information to compare the consumptions of the main food groups by men in Q4 and women in Q1. (You are not required to consider whole grains, root vegetables or milk.).

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

SOLUTION NO A: the data in this table given from a survey of diet of 1308 men and 1540 women their sum is 2848.

So first we find out mean of men and women.

MEAN OF fresh vegetables=

$$\text{Men} = \frac{(204+259+266+317)}{4} = 261.5 \text{ or } 261.$$

$$\text{Women} = \frac{(178+235+266+304)}{4} = 245.75 \text{ or } 246.$$

Mean of fruits =

$$\text{Men} = \frac{(31+45+69=105)}{4} = 62.5 \text{ or } 62$$

$$\text{Women} = \frac{(28+46+70+212)}{4} = 66.25$$

Mean of rice;

$$\text{Men} = \frac{(367+337+269+246)}{4} = 304.75 \text{ or } 305.$$

$$\text{Women} = \frac{(315+276+243+220)}{4} = 263.5.$$

Mean of fish;

$$\text{Men} = \frac{(23+28+31+44)}{4} = 31.5.$$

$$\text{Women} = \frac{(19+21+28+46)}{4} = 28.5$$

MEAN OF meat;

$$\text{Men} = \frac{(70+61+69+77)}{4} = 69.25 \text{ or } 69.3$$

$$\text{Women} = \frac{(48+43+54+63)}{4} = 52.$$

So,

Now after this we find out the standard deviation or SD we will first multiply SE with total number of men and women Like;

$$\text{SE} \times \sqrt{\text{men}} \text{ or } \text{SE} \sqrt{\text{women}}.$$

Fresh veg;

$$\text{Men} = 0.9 \times \sqrt{1308} = 32.5$$

$$\text{Women} = 0.8 \times \sqrt{1540} = 31.4$$

Sol of Fruits;

$$\text{Men} = 0.5 \times \sqrt{1308} = 18.08 \text{ or } 18.1.$$

$$\text{Women} = 0.4 \times \sqrt{1540} = 15.69 \text{ or } 15.7.$$

Sol of Rice;

$$\text{Men} = 1.0 \times \sqrt{1308} = 36.17 \text{ or } 36.2$$

$$\text{Women} = 0.8 \times \sqrt{1540} = 31.4$$

Sol of meat;

$$\text{Men} = 0.4 \times \sqrt{1308} = 14.46 \text{ or } 14.5.$$

$$\text{Women} = 0.3 \times \sqrt{1540} = 11.77 \text{ or } 11.8.$$

So by calculating the overall mean combined we multiply the total number of men and add it with total number of women and then mean dividing with the total of both,

$$= \frac{(1038 \text{ men}) \times (\text{mean}) + (1540 \text{ women}) \times (\text{mean})}{2848}$$

$$\text{Overall for fresh vegetables} = \frac{(1308 \times 261.5) + (1540 \times 245.8)}{2848} = 253.0.$$

$$\text{Overall mean of fruit} = \frac{(1308 \times 62.5) + (1540 \times 66.25)}{2848} = 64.53.$$

$$\text{Overall mean of rice} = \frac{(1308 \times 304.75) + (1540 \times 263.5)}{2848}$$
$$= 282.44.$$

$$\text{Overall mean of fish} = \frac{(1308 \times 31.5) + (1540 \times 28.5)}{2848} = 29.88.$$

$$\text{Overall mean of meat} = \frac{(1308 \times 69.25) + (1549 \times 52)}{2848} = 59.92.$$

Part B;

Describe in words what the figures for milk, root vegetable, wheat flour, consumption indicate.

- Consumption of milk for both men and women are low in Q3 and Q4 but it is sharply rise in Q1 and Q2.
- Fresh vegetable consumption is very low in Q3 and Q4 but it is rise sharply Q1 and Q2.
- Consumption of wheat flour for both men and women is very low in Q3 and Q4 but it is sharply increases in Q1 and Q2.

Part C:

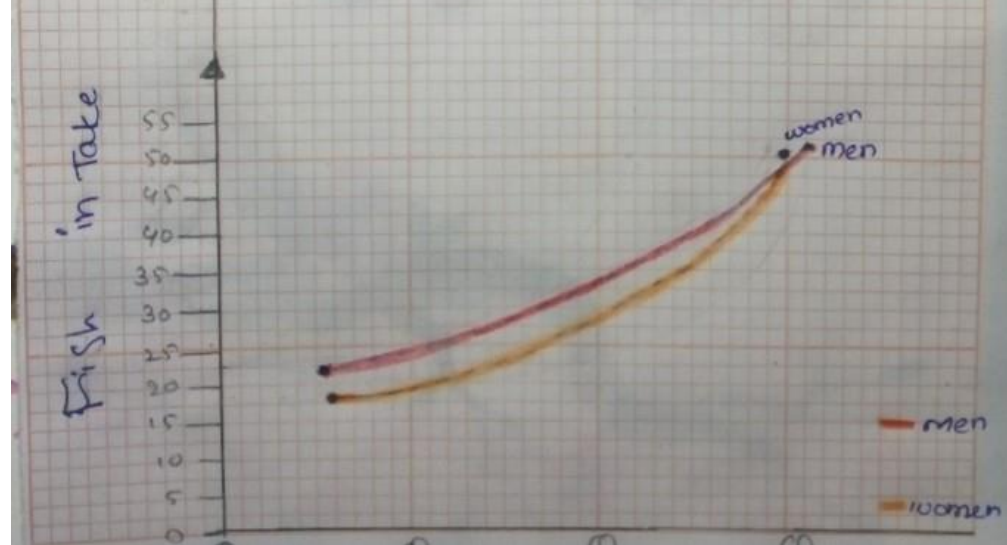
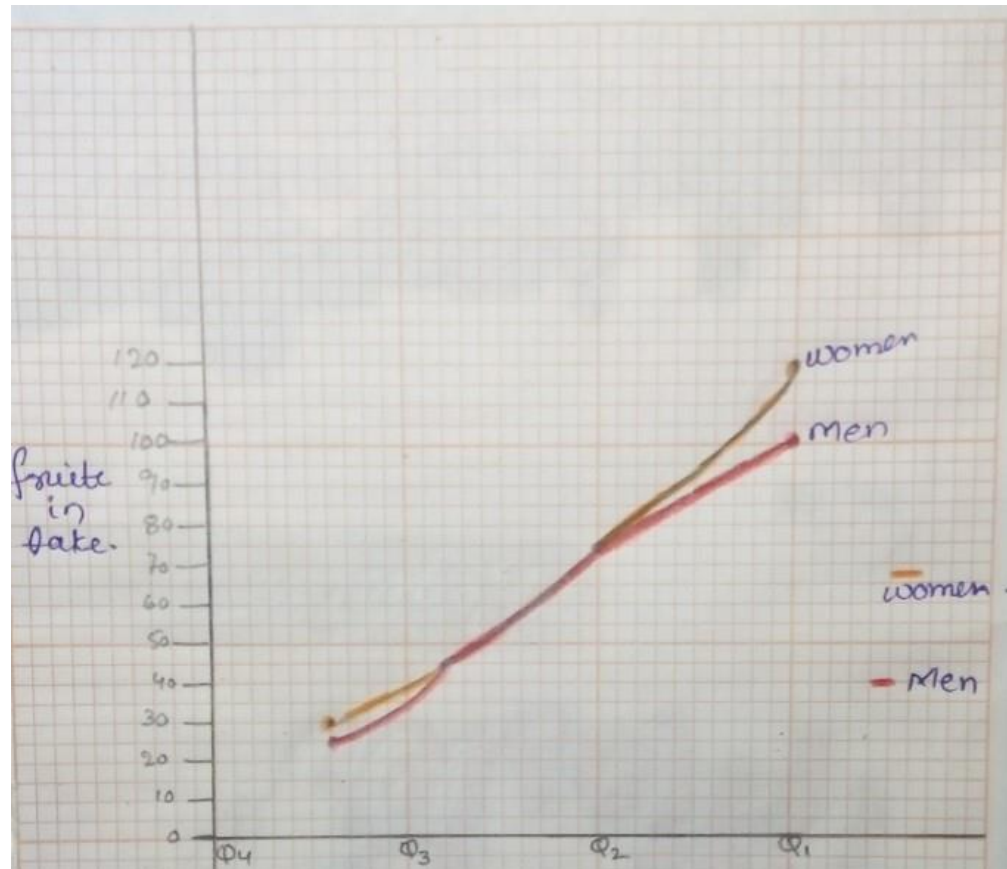
What distinctive pattern is there, for both men and women, in rice, fruit, and fish consumption across the four parts, Q4 to Q1?

- 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:

Draw a suitable diagram to show the difference in consumption patterns of fish and fruits between men and women?

Graph;



Part E:

Men require, on average, about 20% more food per day than women to maintain energy levels. Use this information to compare the consumptions of the main food groups by men in Q4 and women in Q1. (You are not required to consider whole grains, root vegetables or milk.)

Group	Men Q4	WOMEN Q4
FRESH VEGATABLE	204	304
FRUIT	31	121
RICE	367	202
WHEAT FLOUR	79	180
MEAT	70	63
FISH	23	48

There is a large scale of consumption present in a pattern.

Men eats more rice and meat then women and women eats high quantity of fresh veg, fruits, wheat flour, and fish.

Part F:

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

Standard deviation of whole grain and root vegetable for men and women is very less. So, therefor whole grain and root vegetable is in best result.

QUESTION 2:

In the United Kingdom there has been a national census every 10 years since 1801 (with the exception of 1941). At the time of the 2011 UK census, a government minister described the census as 'expensive, inaccurate and inefficient', and 'out of date almost before it's done'.

The minister also said that data held by the National Health Service, local councils, the postal service, the electoral register, tax returns, credit card firms and phone companies can do the job. A proposal for the 2021 UK census is that it should be conducted online and that it should incorporate additional data held by government agencies.

- a. Describe the purpose of a census.
- b. Explaining how it differs from a sample survey and from routine collection of data by government agencies.

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

d. In the 2011 UK census, almost 170 000 people stated their religion as 'Jedi Knight'. (Jedi Knights are characters in the 'Star Wars' films.) Discuss what responses of this type indicate about the attitudes of some members of the public to the census. Discuss also whether responses of this type invalidate asking a question about religion.

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

f. Discuss the potential problems in incorporating additional data held by government agencies.

PART A;

A. Describe the purpose of a census.

PURPOSES:

THE purpose of a census is to enumerate, and collect data on every member of a population.

Well the information is used to get a broader sense about the population in general. This information then is used to calculate the number of seats that each state will have in the U.S. House of

Representatives. The information is also used to determine which communities will receive federal funding and how much.

Part B:

B: Explaining how it differs from a sample survey and from routine collection of data by government agencies.

Difference:

The census is a snapshot whereas various administrative records snap continuous time and would have to be analyzed with some difficulty to get a spot for a particular date.

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 department records will not be so we also address particular questions (e.g. language, spoken, religion) which government records are unlikely to contain.

Part C;

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

Solution;

A participation rate of 94% is high and to that extent might be regarded as giving very good information when compared with other data.

So, however the nature of the missing 6% is an issue. These people are likely to be untypical of the 94% who participate.

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

Part D:

In the 2011 UK census, almost 170 000 people stated their religion as 'Jedi Knight'. (Jedi Knights are characters in the 'Star Wars' films.) Discuss what responses of this type indicate about the attitudes of some members of the public to the census. Discuss also whether responses of this type invalidate asking a question about religion.

ANSWER:

“Jedi knight” is not in any real religion.

This indicates that people do not always take the census seriously. Judaism attracted public attention in 2001 when a number of people recorded their religion as “Jedi” on national censuses. Judaism is inspired by certain elements of Star Wars namely the functional religion of the “Jedi” The real world “Jedi” movement has no founder or central structure.

Then Jediism received press coverage following a word wide email campaign in 2001 urging people to write “Jedi” as their answer to

religion classification question in their country census resulting in the Jedi census phenomenon.

Jedi people believed that Jedi guardian of peace and justice. But in actually Jedi are mindful of the negative emotion which lead to the DARK SIDE.

PART E:

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

ANSWER:

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

People will do not report their real address.

People may missed their occupational and work place area or space.

Dwelling – building register does not include all dwelling.

Quality problem.

Part F:

Discuss the potential problems in incorporating additional data held by government agencies.

the potential problem is incorporation additional data held by the government and record matching and combining of data could be a huge problem to deal with.

QUESTION: 3

a. Find

A.M,G.M,H.M,Median,Mode,Quartiles,Deciles,Percentiles,Range,M.D,Q.D,Varianc e, Standard Deviation, Coefficient of variation, Skewness for the following data.

Rainfall (inches)	Number Of year.
20-24	1
25-29	3
30-34	5
35-39	8
40-44	5
45-49	2
50-54	0
55-59	1

Solution: 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

	$\Sigma f=25$	$\Sigma x=316$	$\Sigma fx=920$	$\Sigma f/x=0.715$		$\Sigma f \log x=38.97$
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$$\Sigma f=25, \Sigma x=316, \Sigma fx=920, \Sigma f/x=0.715, \Sigma f \log x=38.97.$$

Find A.M (ARITHMETIC MEAN)?

AS we know that the formula of A.M:

$$\text{THAT is } \bar{x} = \frac{\Sigma fx}{\Sigma f}$$

So by putting values in it;

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

$$x=36.8.$$

HARMONIC MEAN;

Second equation which we need to find that is harmonic mean

As we know that the formula for group harmonic mean is;

$$H.M = \frac{\Sigma f}{\Sigma f/x}$$

By putting values in it

$$H.M = \frac{25}{0.715} = 35$$

So the answer is 35.

Then we find out **geometric mean G.M;**

AS WE KNOW THE FORMULA

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

$$G.M = \text{antilog} \left(\frac{38.97}{25} \right) = 35.4 \text{ answer}$$

MEADIAN;

TO find out the median of the equation first we find out the CF of the given equation;

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
	$\sum f = 25$	

After this we know find the median of the upper equation;

As we know the formula for median

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

Putting the values in equation **one**1

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

Which lies in group of 35-39

$$\text{Median} = \frac{l+h}{f} (n \setminus 2 - c) \dots\dots\dots 2$$

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

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

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

So median = 37 answer

Mode;

As we know that mode formula;

$$\text{Mode} = l + \frac{f_m - f_o}{2f_m - f_o - f_1}$$

Putting values in it;

$$\text{Mode} = 35 + \frac{8-5}{2(8)-5-5} \times 5$$

$$= 35 + 15 \div 6$$

$$\text{Mode} = 35 + 2.5$$

$$= 37.5.$$

Find quartile.

As we know that

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

Putting values in it

$$25 \div 4 = 6.25$$

$$Q1 = L + \frac{h}{f} (n \div 4 - c)$$

$$Q1 = 30 + 2.5$$

$$Q1 = 32.5$$

Similarly Q2 is equal to median

Similarly; Q3

$$Q3 = 3n \div 4$$

$$Q3 = 3(25) \div 4$$

$$Q3 = 18.75.$$

AS WE KNOW THAT

$$Q3 = L + \frac{h}{f} (3n \div 4 - c)$$

$$Q3 = 40 + 5 \div 8 (18.5 - 17)$$

$$Q3 = 40 + (0.5)$$

$$Q3 = 40.5 \text{ ANSWER.}$$

HOW TO FIND DECILE;

As we know that

$$D = n \div 10 = 25 \div 10$$

$$D = 2.5$$

Which lies in the group of

25- 29

Using formula

$$D1 = l + \frac{h}{f} (n \div 10 - c)$$

Putting values in it

$$D1 = 25 + \frac{5}{3} (2.5 - 1)$$

$$D1 = 25 + 1.67(1.5)$$

$$D1 = 27.5$$

SIMILARLY

$$D2 = 2N \div 10$$

PUTTING VALUES

$$D2 = 2(25) \div 10$$

$$= 50 \div 10 = 5$$

USING FORMULA

$$D2 = l + \frac{h}{f} (2n \div 2 - c)$$

PUTTING FORMULA

$$D2 = 30 + 5 \div 5 (5 - 4)$$

$$D2 = 30 + 1(1)$$

SIMILARLY

$$D3 = 3n \setminus 10$$

$$D3 = 75 \setminus 10$$

$$= 7.5$$

WHICH LIES IN THE GROUP OF 35-39

USING FORMULA

$$D3 = l + \frac{h}{f} (3n \setminus 10 - c)$$

PUTTING VALUES IN IT

$$D3 = 30 + 5 \setminus 5 (7.5 - 4)$$

$$D3 = 33.5 \text{ ANSWER.}$$

$$D4 = 4(n) \setminus 10$$

$$D4 = 10$$

using formula

$$D4 = l + \frac{h}{f} (4n \setminus 10 - c)$$

$$D4 = 35 + 0.62 = 35.62 \text{ ANSWER}$$

$$D5 = 5(n) \setminus 10$$

$$= 12.5$$

USING FORMULA

$$D5 = l + \frac{h}{f} (5n \setminus 10 - c)$$

$$D5 = 35 + 0.625 (3.5)$$

$$D5 = 37.18 \text{ ANSWER}$$

$$D6 = 6(n) \setminus 10$$

$$D6 = 6(25) \setminus 10$$

$$D6 = 15$$

THEN BY USING FORMULA.

$$D6 = l + \frac{h}{f} (6n \setminus 10 - c)$$

$$D6 = 35 + 5 \setminus 8 (15 - 9)$$

$$D6 = 35 + 0.625(6)$$

$$D6 = 38.7. \text{ ANSWER}$$

$$D7 = 7n \setminus 10 = 7(25) \setminus 10$$

$$D7 = 175 \sqrt{10} = 17.5$$

USING FORMULA

$$D7 = l + \frac{h}{f} (7n \sqrt{10} - c)$$

$$D7 = 40 + 5 \sqrt{5} (17.5 - 17)$$

$$D7 = 40 + 1(0.5)$$

$$D7 = 40.5. \text{ ANSWER.}$$

$$D8 = 8n \sqrt{10}$$

$$= 8(25) \sqrt{10}$$

$$= 20$$

USING FORMULA

$$D8 = l + \frac{h}{f} (8n \sqrt{10} - c)$$

$$D8 = 40 + 5 \sqrt{5} (20 - 17)$$

$$D8 = 40 + 1(3)$$

$$D8 = 43. \text{ answer}$$

$$D9 = 9n \sqrt{10}$$

$$= 9(25) \sqrt{10}$$

$$= 22.5$$

USING FORMULA

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

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

$$D_9 = 1.25 + 45$$

$$D_9 = 46.25 \text{ ANSWER}$$

$$D_{10} = 10n - c$$

$$D_{10} = 10(25) - 10$$

$$D_{10} = 250 - 10$$

USING FORMULA

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

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

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

$$D_{10} = 60$$

PERCENTILE:

AS we that

$$P_i = \frac{i}{n} \times 100$$

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

$$= 250 \backslash 100$$

Using formula

$$P_{10} = l + \frac{h}{f} (in \backslash 100 - c)$$

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

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

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

$$P_{10} = 27.5. \text{ Answer.}$$

$$P_{20} = 20n \backslash 100 = 20(25) \backslash 100$$

$$= 500 \backslash 100 = 5$$

Using formula

$$P_{20} = l + \frac{h}{f} (in \backslash 100 - c)$$

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

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

$$P_{20} = 31 \text{ answer}$$

$$P_{30} = 30n \backslash 100 = 20 (25) \backslash 100$$

$$P_{30} = 750 \backslash 100 = 7.5$$

Using formula

$$P_{30} = l + \frac{h}{f} \left(\frac{in}{100} - c \right)$$

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

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

$$P_{30} = 33.5$$

Similarly

$$P_{45} = \frac{45n}{100}$$

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

$$P_{45} = 11.25$$

Using Formula

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

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

$$P_{45} = 36.15$$

Similarly

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

$$P_{55} = \frac{1375}{100}$$

$$P_{55} = 13.75$$

Using Formula

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

$$P_{55} = 35 + \frac{5}{8} \left(\frac{13.75}{100} - 9 \right)$$

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

$$P_{55} = 37.96$$

Similarly

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

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

$$P_{85} = 21.25$$

Using Formula

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

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

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

$$P_{85} = 44.25$$

Similarly

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

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

$$P_{90} = 22.5$$

Using Formula

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

$$P_{90} = 45 + \frac{5}{8} (22.5 - 22)$$

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

$$P_{90} = 46.25$$

FINDING RANGE.....

As we know that

$$R = X_m - X_o$$

$$X_{\max} = 59$$

$$X_o = 20$$

Putting Values

$$R = 59 - 20$$

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
		$\sum f=25$	$\sum(x-\bar{x})=21.6$		$\sum f(x-\bar{x})=0$	$\sum f(x-\bar{x})^2$ 1374

As we know that

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

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

Putting values

$$\sum f=25$$

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

$$\bar{x}=36.8$$

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

Then

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

Putting values

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

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

FIND VARIANCE

As we know that

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

Putting values

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

$$S^2 = 57.25$$

FINDING STANDARD DEVIATION

As we know that

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

$$S = \sqrt{57.25}$$

$$S = 7.6$$

FIND CO-EFFICIENT VARIATION

As we know that

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

Putting values

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

$$C.V = 20.6$$

FIND SKEWNESS

As we know that

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

Putting values

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

$$S_k = -0.092$$

FIND QUANTILE DEVIATION

As we know that

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

PUTTING VALUES

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

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

$$Q.D = 4$$

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

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

SMALLER VALUE = 21

LARGEST VALUE = 59

SO

L-S

PUTTING VALUES

$$59 - 21 = 38$$

FIND A.M = ?

$$A.M = \bar{X} = \frac{21 + 25 + 29 + \dots + 59}{20}$$

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

$$A.M = \bar{X} = 37$$

X	Log(X)	$\frac{1}{X}$
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

$$\sum \text{Log}(X) = 31.14$$

$$\sum \frac{1}{X} = 0.559$$

FIND G.M

$$G.M = X_G = \text{Antilog}\left(\frac{\sum \text{Log}(x)}{x}\right)$$

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

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

$$X_G = 35.8$$

FIND H.M

$$H.M = \frac{N}{\frac{1}{\bar{X}}}$$

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

$$H.M = 35.7$$

FIND MEDIAN

$$\text{MEDIAN} = \frac{n+1}{2}$$

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

$$\text{MEDIAN} = 10.5$$

FIND MODE

35 WHICH IS MORE REPEATED THAN 1

FIND QUARTILES

$$Q = \frac{n+1}{4}$$

PUTTING VALUES

$$Q = \frac{20+1}{4}$$

$$Q = 5.25$$

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

$$Q1=31.2$$

$$Q2=2\left(\frac{n+1}{4}\right)$$

$$Q2=2(5.2)$$

$$Q2=10.5$$

$$Q2=36+0.5(37-36)$$

$$Q2=36.5$$

$$Q3=3\left(\frac{n+1}{4}\right)$$

$$Q3=3(5.2)$$

$$Q3=15.75$$

$$Q3=42+0.75(43-42)$$

$$Q3=42.7$$

FIND DECILES

$$D1=\frac{n+1}{10}$$

$$D1=\frac{20+1}{4}$$

$$D1=2.1$$

$$D1=25+0.1(29-25)$$

$$D1=25+0.1(4)$$

$$D1=25+0.4$$

$$D2=2\left(\frac{n+1}{10}\right)$$

$$D2=4.2$$

$$D2=30+0.2(31-30)$$

$$D2=30.2$$

$$D3=3\left(\frac{n+1}{10}\right)$$

$$D3=6.3$$

$$D3=32+0.3(33-32)$$

$$D3=32.3$$

$$D4=4\left(\frac{n+1}{10}\right)$$

$$D4=8.4$$

$$D4=34+0.4(35-34)$$

$$D4=34.04$$

$$D5=5\left(\frac{n+1}{10}\right)$$

$$D5=10.5$$

$$D5=36+0.5(37-36)$$

$$D5=36.5$$

$$D6=6\left(\frac{n+1}{10}\right)$$

$$D6=12.6$$

$$D6=38+0.6(39-38)$$

$$D6=38.6$$

$$D7=7\left(\frac{n+1}{10}\right)$$

$$D7=14.7$$

$$D7=41+0.7(42-41)$$

$$D7=41.7$$

$$D8=8\left(\frac{n+1}{10}\right)$$

$$D8=16.8$$

$$D8=43+0.8(44-43)$$

$$D8=43.8$$

$$D9=9\left(\frac{n+1}{10}\right)$$

$$D9=18.9$$

$$D9=47+0.9(48-47)$$

$$D9=47.9$$

TO FIND PERCENTILE

As we know that

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

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

$$P_{10}=2.1$$

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

$$P_{10}=25.4$$

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

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

$$P_{20} = 4.2$$

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

$$P_{20} = 30.2$$

$$P_{30} = \frac{30(20+1)}{100}$$

$$P_{30} = 6.3$$

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

$$P_{30} = 32.3$$

$$P_{40} = \frac{40(20+1)}{100}$$

$$P_{40} = 8.4$$

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

$$P_{40} = 34.04$$

$$P_{50} = \frac{50(20+1)}{100}$$

$$P_{50} = 10.5$$

$$P_{50} = 36 + 0.4(37 - 36)$$

$$P_{50} = 36.5$$

$$P_{60} = \frac{60(20+1)}{100}$$

$$P_{60}=12.6$$

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

$$P_{60}=38.6$$

$$P_{90}=\frac{90(20+1)}{100}$$

$$P_{90}=19.95$$

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

$$P_{90}=47.95$$

TO FIND RANGE

As we know that

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

$$X_{\max}=59$$

$$X_{\min}=21$$

$$R=38$$

TO FIND QUARTILE DEVIATION

As we know that

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

$$Q_3=42.7$$

$$Q_1=31.2$$

SO ,

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

Q.D=5.7

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

As we know that

$$\frac{\sum x}{n} = \frac{744}{20}$$

$$= 37.2$$

We also know that

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

PUTTING THE VALUES

$$M.D = 0 \setminus 20$$

$$M.D=0.$$

TO FIND VARIANCE

USING FORMULA

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

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

$$S^2 = 71.9$$

TO FIND STANDARD DEVIATION

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

$$S = \sqrt{71.9}$$

$$S = 8.4$$

TO FIND CO-EFFICIENT VARIATION

USING FORMULA

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

$$C.V = \frac{840}{37.2}$$

$$C.V = 22.5$$

TO FIND SKEWNESS

USING FORMULA

$$S_k = \frac{\text{Mean} - \text{Mode}}{SD}$$

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

$$S_K = 0.26s$$

