

Name : M. USama

ID : 13622

Programme : BS (D.T)

Semester : 6<sup>th</sup> (Mid Term)

Paper : Biostatistics

Submitted To : Sir, Anwar Shamim.

Date : 17/4/2020

①

Q1 :-

Ans: (A)

\* Mean consumption of fresh vegetable for Men and women.

So formula is  $\bar{x} = \frac{\sum x_i}{n}$

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

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

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

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

\* Mean consumption of fruits for Men and women.

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

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

$$\text{Mean for women} = \frac{28 + 46 + 70 + 121}{4}$$

$$\boxed{\text{Mean} = 66.2}$$

(2)

\* Mean consumption of Rice for Men and women.

$$\text{Mean for Men} = \frac{367+337+269+246}{4}$$

$$\text{Mean} = 304.7$$

$$\text{Mean for Women} = \frac{315+276+243+220}{4}$$

$$\text{Mean} = 263.5$$

\* Mean consumption of Wheat flour for Men and women.

$$\text{Mean for Men} = \frac{79+114+197+253}{4}$$

$$\text{Mean} = 160.7$$

$$\text{Mean for Women} = \frac{56+118+141+180}{4}$$

$$\text{Mean} = 123.7$$

(3)

\* Mean consumption of whole grain for Men and women.

$$\text{Mean of Men} = \frac{2+2+6+27}{4}$$

$$\text{Mean} = 9.25$$

$$\text{Mean of Women} = \frac{1+3+6+22}{4}$$

$$\text{Mean} = 8$$

\* Mean consumption of ~~whole~~ Root veg- for Men and women.

$$\text{Mean for Men} = \frac{7+11+16+29}{4}$$

$$\text{Mean} = 15.7$$

$$\text{Mean for women} = \frac{6+12+17+28}{4}$$

$$\text{Mean} = 15.7$$

(4)

- \* Mean consumption of Meat for Men and women.

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

$$\text{Mean} = 69.2$$

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

$$\text{Mean} = 52$$

- \* Mean consumption of fish for Men and women.

$$\text{Mean for Men} = \frac{23+28+31+44}{4}$$

$$\text{Mean} = 31.5$$

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

$$\text{Mean} = 28.5$$

⑤

\* Mean consumption of Milk for Men and women.

$$\text{Mean for Men} = \frac{2+3+23+39}{4}$$

$$\text{Mean} = 16.7$$

$$\text{Mean for women} = \frac{1+4+15+48}{4}$$

$$\text{Mean} = 17$$

\* Standard Deviation of fresh vegetable for Men and women.

$$S.D = S.E \times \sqrt{\text{No of Men}}$$

$$S.D \text{ for Men} = 0.9 \times \sqrt{1308} = 32.5$$

$$S.D \text{ for women} = 0.8 \times \sqrt{1540} = 31.3$$

\* S.D of fruits for Men and women.

$$S.D \text{ for Men} = 0.5 \times \sqrt{1308} = 18.08$$

$$S.D \text{ for women} = 0.4 \times \sqrt{1540} = 15.6$$

6

\* S.D of Rice for Men and women.

$$\text{S.D for Men} = 1.0 \times \sqrt{1308} = 36.1$$

$$\text{S.D for women} = 0.8 \times \sqrt{1540} = 31.3$$

\* S.D of wheat flour for Men and women.

$$\text{S.D for Men} = 1.0 \times \sqrt{1308} = 36.1$$

$$\text{S.D for women} = 0.1 \times \sqrt{1540} = 3.9$$

\* S.D of whole grain for Men and women.

$$\text{S.D for Men} = 0.1 \times \sqrt{1308} = 3.6$$

$$\text{S.D for women} = 0.1 \times \sqrt{1540} = 3.9$$

\* S.D of Root vegetable for Men and women.

$$\text{S.D for Men} = 0.1 \times \sqrt{1308} = 3.6$$

$$\text{S.D for women} = 0.1 \times \sqrt{1540} = 3.9$$

\* S.D of Meat for Men and women.

$$\text{S.D for Men} = 0.4 \times \sqrt{1308} = 14.4$$

$$\text{S.D for women} = 0.3 \times \sqrt{1540} = 11.7$$

(7)

\* S.D of Milk for Men and women.

$$\text{S.D for Men} = 0.3 \times \sqrt{1308} = 10.8$$

$$\text{S.D for women} = 0.3 \times \sqrt{1540} = 11.7.$$

\* S.D of fish for Men and women.

$$\text{S.D for Men} = 0.2 \times \sqrt{1308} = 7.2$$

$$\text{S.D for women} = 0.2 \times \sqrt{1540} = 7.8.$$

\* Overall mean consumption of Rice

$$\frac{1308 \times 304.7 + 1540 \times 263.5}{2848} = 154.188$$

\* Overall mean consumption of fresh vegetable.

$$\frac{1308 \times 261.5 + 1540 \times 245.75}{2848}$$

$$\Rightarrow \frac{720497}{2848} \Rightarrow \boxed{252.9} \text{ Ans.}$$



⑧

\* Overall mean consumption of fruits

$$\frac{1308 \times 62.5 + 1540 \times 66.2}{2848}$$

$$\Rightarrow \boxed{64.501} \text{ Ans.}$$

\* Overall mean consumption of wheat

$$\frac{1308 \times 304.7 + 1540 \times 123.7}{2848}$$

$$\Rightarrow \boxed{8.371} \text{ Ans}$$

3

9

Part (B) :

It is clear from the table that milk, root, wheat flour and vegetable are present in very small amount for men and women in Q4 and Q3 but in Q1 and Q2 the amount is rises so those who eat most vegetable who consume more milk, root, vegetable and wheat flour than those who eat fresh vegetable and eat more rises.

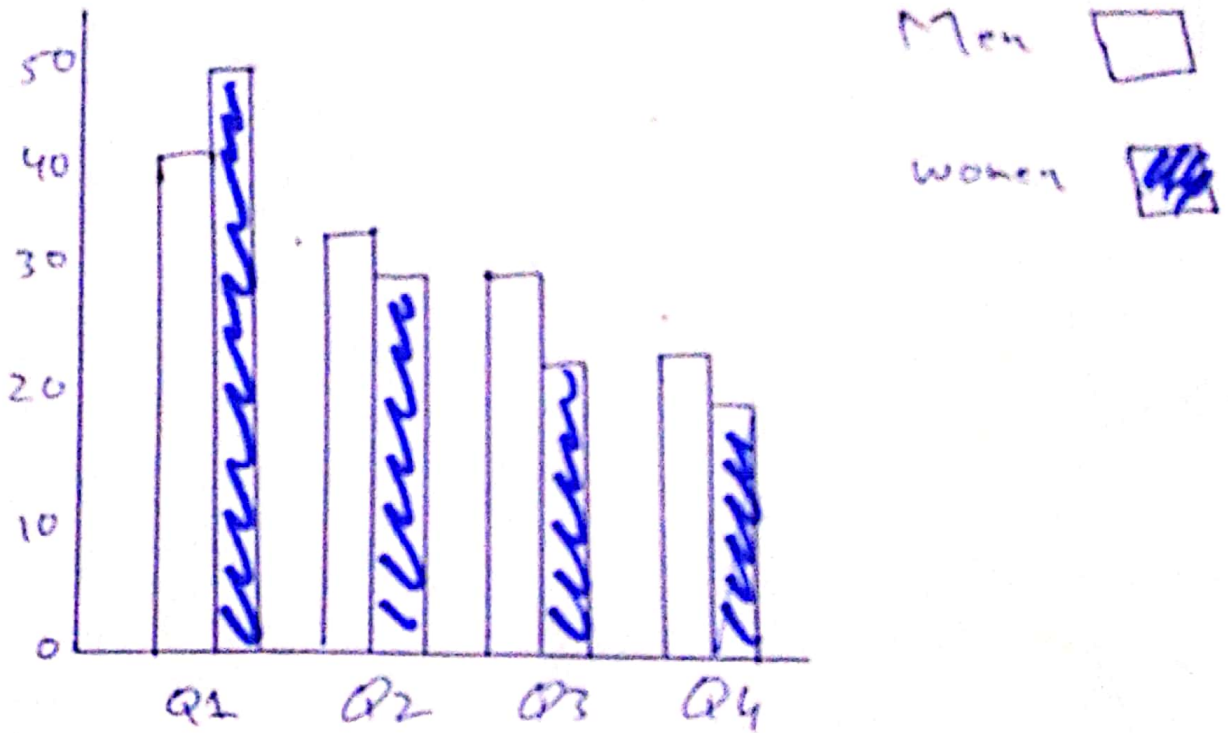
Part (C) :

When the consumption of rice falls for both men and women as fresh vegetable ~~can~~ consumption rises. only the rises is the food the pattern and also lies in fresh vegetable.

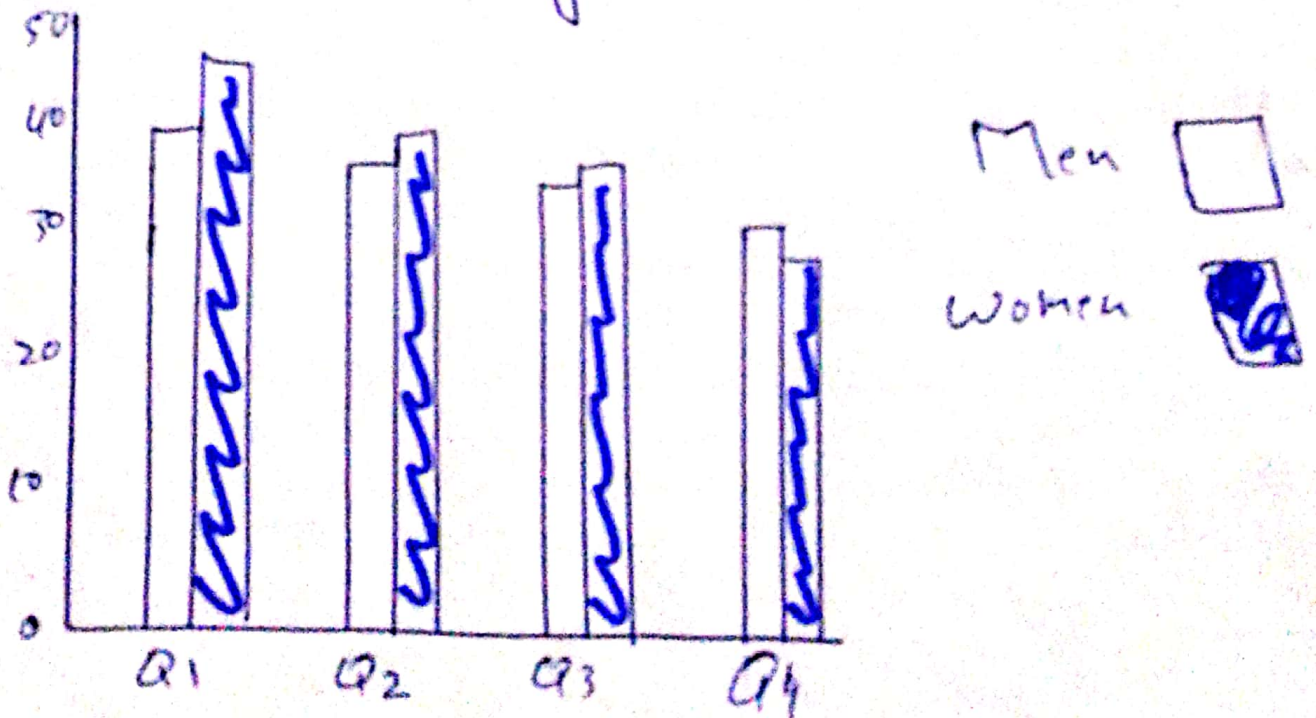
(10)

(D) Part

Label diagram for fish



Label diagram for fruit



(11)

(E) Part 1.

Divide men figure of main food  
Groups by 1.2 and multiply women  
figure by 1.2 to obtain.

	Men	women
Fresh veg	170	178
Fruit	26	28
Rice	306	315
wheat flour	66	56
Meat	58	48
Fish	19	19

There is no vary larg difference  
in pattern consumption but men  
eat more meat and wheat flour.  
while women eat more fresh veg  
fruit and vice.

(12)

F: Part 1

Standard deviation =  $S.E \times \sqrt{n}$

By using above formula the value of standard deviation of men in more than women wheat flour vegetable, fruit, wheat flour, whole grain.

(13)

Q2:

Part A:

The purpose of census is to count the entire population of a country and individual at location where they actually live. census count the number of living in the home. Their age, sex and race. It helps in the forming and important base for planning policy development and decreasing numbering.

Part B:

In census each and every unit of population is studied in the sampling. the census refer to periodic collection of information about the populace from the entire

P-T-O

(14)

Population - it is more suitable to use

the census method - If population is same in nature, the census survey is much bigger in population compare to simple survey -

Census survey take more time -

Part v. c →

Obviously not having a full response rate to the census is a problem for the - Accuracy of census as insufficient data will be collected to know about population and of following base for planning and policy development.

(15)

Part D:

Ironic Response to the census by

Public signify their inward

attitude to the survey and their

carelessness in following accurate

data.

Questions of these type are

invalidated with such abuse

Responses.

Part E:

Not all of the population is a

Internet friendly so may be the

response rate might be less other

area of concern are cost

pressure.



Part v. fi.

There may be additional concern about security of information when it is supplied online additional information held by government agencies is ~~not~~ unlikely to be complete record matching in combining data basis is a notorious problem.

Q3:-

(17)

(A) Find the following

- ① A.M, G.M, H.M, Median, Mode, Quartiles, Deciles, Percentile, Range, M.O, Q.D, Variance, Standard Deviation, Coefficient of variation, skewness for the following data.

Rainfall (Inch)	No of years
20-24	1
25-29	3
30-34	5
35-39	8
40-44	5
45-49	2
50-54	0
55-59	1

Ans :-\* Arithmetic Mean :

Classes	f	x	fx
20-24	1	22	22
25-29	3	27	81
30-34	5	32	106
35-39	8	37	296
40-44	5	42	210
45-49	2	47	94
50-54	0	52	0
55-59	1	57	57
	25		920

$$A.M (\bar{x}) = \frac{1}{N} \sum fx$$

$$\Rightarrow \frac{1}{25} \times 920$$

$$A.M = 36.8 \quad \underline{\underline{\text{Ans}}}$$

\* Geometric Mean :-

(18)

Classes	f	x	f log x
20-24	1	22	1.342
25-29	3	27	4.294
30-34	5	32	7.526
35-39	8	37	12.546
40-44	5	42	8.116
45-49	2	47	3.344
50-54	0	52	0
55-59	1	57	1.756
	25		38.924

$$\text{Antilog} \left( \frac{\sum f \log x}{\sum f} \right)$$

$$\text{Antilog} \left( \frac{38.924}{25} \right)$$

$$\text{Antilog} (1.5571)$$

$$\text{G.M} = 36.05$$

Ans -

\* Harmonic Mean :-

classes	f	x	F/x
20-24	1	22	$\frac{1}{22} = 0.045$
25-29	3	27	$\frac{3}{27} = 0.111$
30-34	5	32	$\frac{5}{32} = 0.156$
35-39	8	37	$\frac{8}{37} = 0.216$
40-44	5	42	$\frac{5}{42} = 0.119$
45-49	2	47	$\frac{2}{47} = 0.043$
50-54	0	52	$\frac{0}{52} = 0$
55-59	1	57	$\frac{1}{57} = 0.018$
	$\sum f = 25$		$\sum (f/x) = 0.708$

$$H.M = \frac{\sum f}{\sum (f/x)}$$

$$\Rightarrow \frac{25}{0.708}$$

$$H.M = 35.311$$

Ans -

(19)

\* Median :-

classes	f	x	cf
20-24	1	22	1
25-29	3	27	4
30-34	5	32	9
35-39	8	37	17
40-44	5	42	22
45-49	2	47	24
50-54	0	52	24
55-59	1	57	25

Total  $N = 25$ Here  $N = 25 \Rightarrow \frac{N}{2} = 12.5$ 

The cumulative frequency just greater than  $\frac{1}{2}N$  is 17.5 and the value of  $x$  corresponding to 17.5 is 7.

Therefore median is 7.

\* Mode :-

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

Solution :- value of  $x$  corresponding to the maximum frequency, viz..... 8 is 37

Hence Mode is 37

(20)

\* Quartiles :-

$$Q_i = L + \frac{h}{f} \left( \frac{n \times i}{4} - C.f \right)$$

$$\textcircled{1} \quad Q_1 = L + \frac{h}{f} \left( \frac{n \times 1}{4} - C.f \right)$$

1st we have to calculate the quartile class.

Quartile class = size of  $\frac{i(n+1)}{4}$ th item.

Class containing  $Q_1 =$  size of  $\frac{1(25+1)}{4}$ th.

$Q_1 =$  size of 7th item.

$$Q_1 = 29.5 - 34.5$$

Now

$$Q_1 = L + \frac{h}{f} \left( \frac{n \times 1}{4} - C.f \right)$$

$$Q_1 = 29.5 + \frac{05}{05} \left( \frac{25 \times 1}{04} - 04 \right)$$

$$Q_1 = 29.5 + 1(2.25) = \boxed{31.75} \text{ Ans.}$$

(21)

### \* Quartile Deviation :-

Classes	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

$$Q_1 = \frac{N}{4} = \frac{25}{4} = 6.25$$

$$Q_1 = L_1 + \frac{N/4 - cf}{L} \times i$$

$$Q_1 = 30 + \frac{6.25 - 4}{5} \times 8$$

$$Q_1 = 30 + \frac{2.25}{5} \times 8$$

$$Q_1 = 30 + \frac{18}{5}$$

$$Q_1 = 81.600$$

$$Q_3 = \frac{3N}{4} \Rightarrow \frac{3 \times 25}{4} = 18.750$$

As we know that

$$L = 40, \frac{3N}{4} = 18.750,$$

$$cf = 17 \text{ and } L = 5, I = 8.$$

$$Q_3 = 40 + \frac{18.750 - 17}{5} \times 8$$

$$Q_3 = 40 + \frac{1.750}{5} \times 8$$

$$Q_3 = 40 + \frac{14}{5} \times 8$$

$$Q_3 = 40 + \frac{14}{5}$$

$$Q_3 = 40 + 2.800$$

$$Q_3 = 42.800$$

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

$$Q.D = \frac{42.800 - 81.600}{2}$$

$$Q.D = -19.400$$

Ans.

(22)

\* Decile :-

$$\textcircled{1} D_1 = \frac{1 \times (n+1)}{10}$$

$$\text{so } n = 8$$

$$D_1 = \frac{1 \times (8+1)}{10}$$

$$D_1 = 0.9$$

$$\textcircled{2} D_2 = \frac{2 \times (8+1)}{10}$$

$$D_2 = 1.8$$

$$\textcircled{3} D_3 = \frac{3 \times (8+1)}{10}$$

$$D_3 = 2.7$$

$$\textcircled{4} D_4 = \frac{4 \times (8+1)}{10}$$

$$D_4 = 3.6$$

$$\textcircled{5} D_5 = \frac{5 \times (8+1)}{10}$$

$$D_5 = 4.5$$

P-T-O

(23)

$$\textcircled{6} \quad D_6 = \frac{6 \times (8+1)}{10}$$

$$D_6 = 5.4$$

$$\textcircled{7} \quad D_7 = \frac{7 \times (8+1)}{10}$$

$$D_7 = 6.3$$

$$\textcircled{8} \quad D_8 = \frac{8 \times (8+1)}{10}$$

$$D_8 = 7.2$$

$$\textcircled{9} \quad D_9 = \frac{9 \times (8+1)}{10}$$

$$D_9 = 8.1$$



\* Percentile :-

(24)

$$P = 1\% \times 8 = 0.01 \times 8 = 0.08$$

$$P_{10} = \frac{10}{100} \times 8$$

$$P_{10} = 0.8$$

$$P_{25} = Q_1 = \frac{25}{100} \times 8$$

$$P_{25} = 2$$

$$P_{50} = Q_2 = \frac{50}{100} \times 8$$

$$P_{50} = 4$$

$$P_{75} = Q_3 = \frac{75}{100} \times 8$$

$$P_{75} = 6$$

\* Range :-

Classes
20 - 24
25 - 29
30 - 34
35 - 39
40 - 44
45 - 49
50 - 54
55 - 59

Minimum ← (20 - 24)

(55 - 59) ↓ Maximum

Therefore

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

$$= 59 - 20$$

$$\text{Range} = 39$$

Ans

\* Mean Deviation :-

classes	f	x	fx	$D = x - \bar{x}$	$ D  =  x - \bar{x} $	$f \cdot  x - \bar{x} $
20 - 24	1	22	22	-14.800	14.800	14.800
25 - 29	3	27	81	-9.800	9.800	29.400
30 - 34	5	32	160	-4.800	4.800	24.0
35 - 39	8	37	296	0.200	0.200	1.600
40 - 44	5	42	210	5.200	5.200	26
45 - 49	2	47	94	10.200	10.200	20.400
50 - 54	0	52	0	15.200	15.200	0
55 - 59	1	57	57	20.200	20.200	20.200
Total	25		920			136.800

$$\bar{x} = \frac{\sum fx}{\sum f} = \frac{920}{25}$$

$$\bar{x} = 36.800$$

$$M.D = \frac{\sum f|x - \bar{x}|}{\sum f}$$

$$M.D = \frac{136.800}{25}$$

$$M.D = 5.472$$

Ans

(26)

\* Variance :-

classes	f	x	fx	$\bar{x}$	$x - \bar{x}$	$(x - \bar{x})^2$
20-24	1	22	22	36.800	-14.800	219.040
25-29	3	27	81	36.800	-9.800	96.040
30-34	5	32	160	36.800	-4.800	23.040
35-39	8	37	296	11	0.200	0.040
40-44	5	42	210	11	5.200	27.040
45-49	2	47	94	11	10.200	104.040
50-54	0	52	0	11	15.200	231.040
55-59	1	57	57	11	20.200	408.040

$\sum f = 25$      $\sum fx = 920$      $\sum f(x - \bar{x})^2 = 1108.320$

Mean :  $\bar{x} = \frac{920}{25} = 36.800$

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

Variance =  $\frac{1108.320}{24}$

$V = 4.618$  Ans.

(27)

\* Standard Deviation :-

As we also know that

$$\sum f = 25, \sum f(x - \bar{x})^2 = 1108.320$$

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

Now the value in formula -

$$S.D = \sqrt{\frac{1108.320}{25-1}} \Rightarrow \sqrt{\frac{1108.320}{24}}$$

$$S.D = \sqrt{46.180}$$

$$S.D = 6.796$$

\* Coefficient of Variation :-

As we also know that

$$S.D = 6.796, A.M = 36.8$$

$$C.V = \frac{S.D}{A.M} \times 100 \Rightarrow \frac{6.796}{36.8} \times 100$$

$$C.V = 18.467$$

Ans.

(28)

\* Skewness ::

Formula -

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

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

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

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

(29)

Q3 :- Part (B) :-

Group data to Ungrouped.

Rainfall Inche	No 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

Ungrouped data Sequence -

20, 24, 25, 29, 30, 34, 35, 39, 40, 44, 45,  
49, 50, 54, 55, 59.

\* Harmonic Mean:

(30)

x	1/x	$\Sigma 1/x$
20	1/20	0.05
24	1/24	0.04
25	1/25	0.04
29	1/29	0.03
30	1/30	0.033
34	1/34	0.028
35	1/35	0.028
39	1/39	0.025
40	1/40	0.025
44	1/44	0.022
45	1/45	0.022
49	1/49	0.020
50	1/50	0.02
54	1/54	0.018
55	1/55	0.018
59	1/59	0.016
Total		0.687

$$\frac{\Sigma 1/x}{n}$$

$$\Rightarrow H.M = \frac{n}{\Sigma 1/x}$$

$$\Rightarrow H.M = \frac{16}{0.687}$$

$$\Rightarrow \boxed{H.M = 23.28}$$

Ans -

(31)

\* Range :-

20, 24, 25, 29, 30, 34, ..., 59

So the formula for Range is

$$\text{Range} = x_{\text{Max}} - x_{\text{Mini}}$$

$$\text{Range} = 59 - 20 = 39$$

So the Range is 39.

\* Arithmetic Mean :

20, 24, 25, 29, 30, 34, ..., 59.

formula

$$\bar{x} = \frac{\sum x}{N}$$

Now putting values in formula.

$$\bar{x} = \frac{632}{16}$$

A.M = 39.5
------------

 Ans.



(32)

\* Quartile :-

$$R \left( \frac{N+1}{4} \right) \Rightarrow 1 \left( \frac{16+1}{4} \right) = 4.25$$

$$Q_1 = 4^{\text{th}} + .25 (5^{\text{th}} - 4^{\text{th}}).$$

$$= 29 + .25 (30 - 29)$$

$$= 29 + .25 (1)$$

$$Q_1 = 29.25$$

$$Q_3 = 3 \left( \frac{16+1}{4} \right) = 12.75$$

$$Q_3 = 12^{\text{nd}} + .75 (13^{\text{nd}} - 12^{\text{nd}})$$

$$Q_3 = 49 + .75 (50 - 49)$$

$$Q_3 = 49 + .75 (1)$$

$$Q_3 = 49.75$$

$$Q_2 = 2 \left( \frac{16+1}{4} \right) = 8.5$$

$$Q_2 = 8^{\text{th}} + .5 (9^{\text{th}} - 8^{\text{th}})$$

P-T-O

(33)

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

1<sup>st</sup> we complete the class having "Q<sub>3</sub>" -

∴ Class containing Q<sub>3</sub> = size of  $\frac{3(n+1)}{4}$ th

Class containing Q<sub>3</sub> = size of  $\frac{3(25+1)}{4}$ th

Class containing Q<sub>3</sub> = size of "20th" item.

$$Q_3 = 39.5 - 44.5$$

$$Q_3 = L + \frac{h}{f} \left( \frac{n \times 3}{4} - 17 \right)$$

$$Q_3 = 39.5 + 1(1.75) \Rightarrow \boxed{41.25}$$

Ans -

$$Q_2 = Q_3 - Q_1 = 41.25 - 31.75$$

$$\boxed{Q_2 = 9.5}$$

$$Q_2 = \text{Median} = 9.5$$

P-T-O

(34)

$$Q_2 = 39 + .5(40 - 39)$$

$$Q_2 = 39 + .5(1)$$

$$Q_2 = 39 + .5$$

$$Q_2 = 39.5$$

\* Quartile Deviation :-

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

$$Q.D = \frac{49.75 - 29.25}{2}$$

$$Q.D = 10.25$$

Ans -

\* Mean Deviation :-  $\frac{\sum |x - \bar{x}|}{n}$

$$= \frac{2168}{16}$$

$$M.D = 135.5$$

\* Geometric Mean :- (35)

X	log
20	1.301
24	1.381
25	1.398
29	1.462
30	1.477
34	1.531
35	1.544
39	1.591
40	1.602
44	1.643
45	1.653
49	1.690
50	1.699
54	1.732
55	1.740
59	1.771
Total	25.215

$$G.M = \text{Antilog} \left[ \frac{\sum \log x}{n} \right]$$

$$\text{Antilog} = \left[ \frac{25.215}{16} \right]$$

$$\text{Antilog} = 1.576$$

$$G.M = 37.6$$

Ans.

(36)

\* Mean :-

Add all the number and divide by its total observation.

$$M = \frac{20+24+25+29+30+34+35+39+40+44+\dots+59}{16}$$

$$M = \frac{632}{16}$$

$$M = 39.5 \quad \text{Ans.}$$

\* Median :-

First arrange in Ascending and descending order -

so

Arrangement = 20, 24, 25, 29, 30, 34, 35,  
39, 40, 44, 45, 49, 50, 54,  
55, 59.

$$\text{Middle value} = \frac{39+40}{2} = \frac{79}{2}$$

$$\text{Median} = 39.5 \quad \text{Ans.}$$

(37)

\* Variance :-

20, 24, 25, 29, 30, 34, 35, 39, 40,  
-----, 59 -

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

x	$\bar{x}$	$x - \bar{x}$	$(x - \bar{x})^2$
20	39	-19	361
24	<del>39</del>	-15	225
25	11	-14	196
29	11	-10	100
30	11	-9	81
34	11	-5	25
35	11	-4	16
39	11	0	0
40	11	1	1
44	11	5	25
45	11	6	36
49	11	10	100
50	11	11	121
54	11	15	225
55	11	16	256
59	11	20	400
Total			2168

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

$$V = \frac{2168}{16}$$

$$V = 135.5$$

Ans -

\* Standard Deviation: (38)

$x = 20, 24, 25, 29, 30, 34, 35, 39, 40,$   
 $44, 45, 49, 50, 54, 55, 59.$

Total = 632

first we find mean.

$$\text{Mean} = \frac{632}{16} = 39.5$$

$x$	$\bar{x}$	$x - \bar{x}$	$(x - \bar{x})^2$
20	39	-19	361
24	39	-15	225
25	39	-14	196
29	39	-10	100
30	39	-9	81
34	39	-5	25
35	39	-4	16
39	39	0	0
40	39	1	1
44	39	5	25
45	39	6	36
49	39	10	100
50	39	11	121
54	39	15	225
55	39	16	256
59	39	20	400
			2168

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

$$S = \sqrt{\frac{2168}{16}}$$

$$S = \sqrt{135.5}$$

$$S.D = 11.64$$

Ans -

(39)

\* Decile :-

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

Now

$$D_1 = \frac{1}{10} (16+1)$$

$$D_1 = \frac{17}{10} \Rightarrow 1.7$$

so  $D_1 = 24$

$$D_2 = \frac{2}{10} (16+1)$$

$$D_2 = \frac{17}{5} \Rightarrow 3.4$$

so  $D_2 = 25$

$$D_3 = \frac{3}{10} (16+1)$$

$$D_3 = \frac{51}{10} = 5.1$$

so  $D_3 = 30$

$$D_4 = \frac{4}{10} (16+1)$$

$$D_4 = \frac{34}{5} = 6.8$$

so  $D_4 = 35$

$$D_5 = \frac{5}{10} (16+1)$$

$$D_5 = \frac{17}{2} = 8.5$$

so  $D_5 = 39$

$$D_6 = \frac{6}{10} (16+1)$$

$$D_6 = \frac{3}{5} (17)$$

$$D_6 = \frac{51}{5} \Rightarrow 10.2$$

so  $D_6 = 44$

P. T. O



(40)

$$D_7 = \frac{7}{10} (17)$$

$$D_7 = \frac{119}{10} \Rightarrow 11.9$$

so  $D_7 = 49$

$$D_8 = \frac{8^4}{10^5} (16+1)$$

$$D_8 = \frac{68}{5} \Rightarrow 13.6$$

so  $D_8 = 54$

$$D_9 = \frac{9}{10} (17)$$

$$D_9 = 15.3$$

so  $D_9 = 55$

(41)

\* Percentile ..

$$\frac{P}{100} (n+1)$$

$$Q_1 = 25^{\text{th}}$$

$$\frac{25}{100} (16+1) \Rightarrow 4.25$$

4<sup>th</sup> & 5<sup>th</sup> data put from the  
x value - which is 29 and 30.

$$\frac{29 + 30}{2} = \frac{59}{2} = 29.5$$

$$Q_1 = 29.5$$

$$Q_2 = 50^{\text{th}}$$

$$\frac{50}{100} (16+1) = 8.5$$

8<sup>th</sup> & 9<sup>th</sup> data put from  
the x value which is  
39 and 40.

$$\frac{39 + 40}{2} = \frac{79}{2} = 39.5$$

$$Q_2 = 39.5$$

P - T - O

(42)

$$Q_3 = 75$$

$$\frac{75^3}{100^4} (16+1)$$

$$\Rightarrow 12.75$$

Now put 13<sup>th</sup> and 14<sup>th</sup> value  
from x value.

$$\frac{50+54}{2} = \frac{104}{2}$$

$$Q_3 = 52$$

Now

$$Q_1 = P25$$

$$Q_2 = P50$$

$$Q_3 = P75$$

\* Mode :- Most repeated value is  
called mode. and this observation  
have no repeated value.