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Bs - Dental

module - 6th semester

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Q.2) (a)

      
     The census is the process of recording and collecting of information about the number of given population. ⇒ Purpose of census is that to count the entire population in the given observation.

It helps the govt decide how to distribute funds.

It tell us where are going as a nation. The census tell us that who are and where are.

(B) ⇒ Sample survey:-

      
     Census and sampling survey are two methods of collecting data about the population.

Survey sampling describe the process of selecting a sample of element from a target population to conduct a survey. A sample survey refers to a group of or section of population from which information is to be obtained. The process of sampling is to reduce the cost ~~on~~ on the amount of work that is would

P.T.O



(2)

take to survey the entire target population.

⇒ Census :

It is defined as a survey that measure the entire target population is called a census.

The census tell us that who are and where are going as a nation. It helps the govt to distributes the funds.

(C) From the given information 2011 UK census attracted a response rate of about 94%. which is good but it can rise any kind of error untill situation of complete it can be cause of an error or any be rise error or more.

(D) In the census about asking a specific group may cause of bad behavior or any misunderstanding. It possible that someone not like to answer of these kind of question.

(3)

(E) There are a lot of potential problems in conducting the 2021 UK Census online. The first and main issue is that the availability of online connection and internet to every person of the country is almost impossible. The second thing is that there is also an increase in the problem in personal behavior of people. They may give the response or not according to their own taste or behavior. The only way to overcome this problem is to give the connection to the whole country and make sure and punctual to every person to give the response.

(F) According to government agencies, a census is itself a main study of every object under the observation and it is quite complicated for government agencies to go to every single person and collect the total information because there are a lot of things that have been done by these agencies not only to complete the census.



(4)

Q(1) (A)

For men:

Consumption of fresh vegetable  
mean = sum of all observation

total number of observation

$$\bar{x} = \frac{204 + 259 + 266 + 317}{4}$$

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

$$\bar{x} = 62.5$$

mean of Rice:

$$\bar{x} = \frac{367 + 337 + 269 + 246}{4}$$

$$\bar{x} = \frac{1219}{4}$$

$$\bar{x} = 304.8$$

⇒ mean of fruit:

$$\bar{x} = \frac{31 + 45 + 69 + 105}{4}$$

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

$$\bar{x} = 62.5$$

(5)

mean of fish:

$$\bar{x} = \frac{23 + 28 + 31 + 44}{4}$$

$$\bar{x} = \frac{126}{4}$$

$$\boxed{\bar{x} = 31.5}$$

mean of meat:

$$\bar{x} = \frac{70 + 61 + 69 + 77}{4}$$

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

$$\boxed{\bar{x} = 69.25}$$

⇒ For woman:

mean of fresh vegetable

$$\bar{x} = \frac{178 + 235 + 266 + 304}{4}$$

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

$$\boxed{\bar{x} = 245.8}$$

mean of fruit:

$$\bar{x} = \frac{28 + 41 + 70 + 21}{4}$$

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

$$\boxed{\bar{x} = 66.3}$$



(6)

Mean of rice:

$$\bar{x} = \frac{315 + 276 + 243 + 220}{4}$$

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

$$\bar{x} = 263.5$$

Mean of meat:

$$\bar{x} = \frac{48 + 43 + 54 + 63}{4}$$

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

$$\bar{x} = 52$$

Mean of fish:

$$\bar{x} = \frac{19 + 21 + 28 + 46}{4}$$

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

$$\bar{x} = 28.5$$

⇒ Combined mean for men:

Combine mean of vegetable:

$$\bar{x} = \frac{\bar{x}_1 n_1 + \bar{x}_2 n_2 + \bar{x}_3 n_3 + \dots + \bar{x}_n n_n}{n_1 + n_2 + n_3 + \dots + n_n}$$

(7)

$$\bar{x} = \frac{(236.5)(204) + (236.5)(259) + (236.5)(266) + (236.5)(217)}{204 + 259 + 266 + 217}$$

$$\bar{x} = \frac{223729}{946}$$

$$\boxed{\bar{x} = 236.5}$$

Combine mean of rice :-

$$\bar{x} = \frac{(367)(304.8) + (337)(304.8) + (269)(304.8) + (246)(304.8)}{367 + 337 + 269 + 246}$$

$$\bar{x} = \frac{37149}{1219}$$

$$\boxed{\bar{x} = 304.8}$$

Combine mean of fish :-

$$\bar{x} = \frac{(23)(31.5) + (28)(31.5) + (31)(31.5) + (44)(31.5)}{23 + 28 + 31 + 44}$$

$$\bar{x} = \frac{3905.5}{126}$$

$$\boxed{\bar{x} = 31}$$



(8).

Combine mean of meat :

$$\bar{x} = \frac{(70)(69.25) + (61)(69.25) + (69)(69.25) + (77)(69.25)}{70 + 61 + 69 + 77}$$

$$\bar{x} = \frac{19182.25}{277}$$

$$\boxed{\bar{x} = 69.5}$$

⇒ Combine mean for women :

Combine mean for vegetable :

$$\bar{x} = \frac{(245.75)(178) + (245.75)(235) + (245.75)(266) + (245.75)(304)}{178 + 235 + 266 + 304}$$

$$\bar{x} = \frac{241572.25}{983}$$

$$\boxed{\bar{x} = 245.75}$$

combine mean of meat :

$$\bar{x} = \frac{(52)(48) + (52)(43) + (52)(54) + (52)(63)}{48 + 43 + 52 + 63}$$

$$\bar{x} = \frac{10816}{208}$$

$$\boxed{\bar{x} = 52.5}$$

(9)

combine mean of fish :

$$\bar{x} = \frac{(28.5)(19) + (28.5)(21) + (28.5)(28) + (28.5)(46)}{19 + 21 + 28 + 46}$$

$$\bar{x} = \frac{3249}{114}$$

$$\bar{x} = 28.5$$

combine mean of rice :

$$\bar{x} = \frac{(263.5)(315) + (263.5)(216) + (263.5)(243) + (263.5)(220)}{315 + 216 + 243 + 220}$$

$$\bar{x} = \frac{271168}{1054}$$

$$\bar{x} = 257.2$$

Q1 (B) :

milk, root vegetables and wheat flours are very low for both men and women in Q<sub>4</sub> and Q<sub>3</sub> it increase high Q<sub>2</sub> and Q<sub>1</sub> such as that eat most vegetables consumes much more milk, root vegetables and wheat flour than those who eat less fresh vegetable.

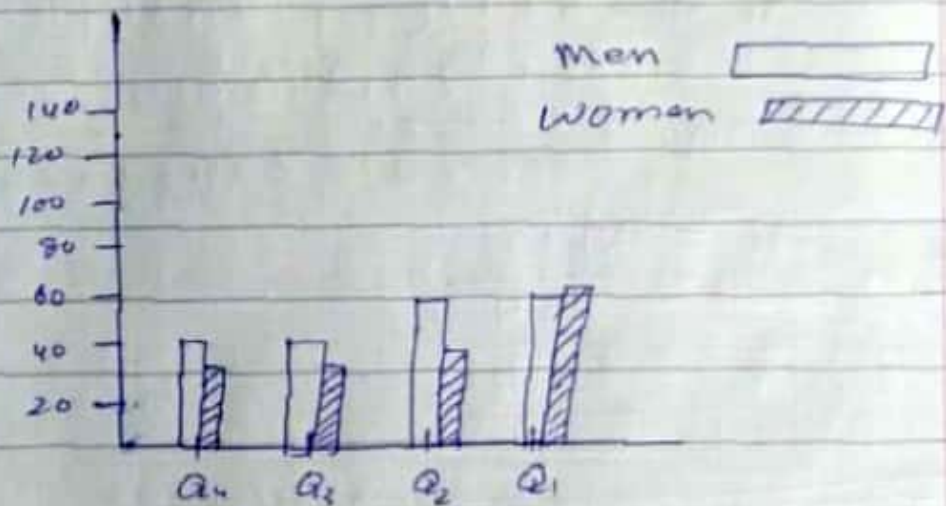


Q(1) (C)

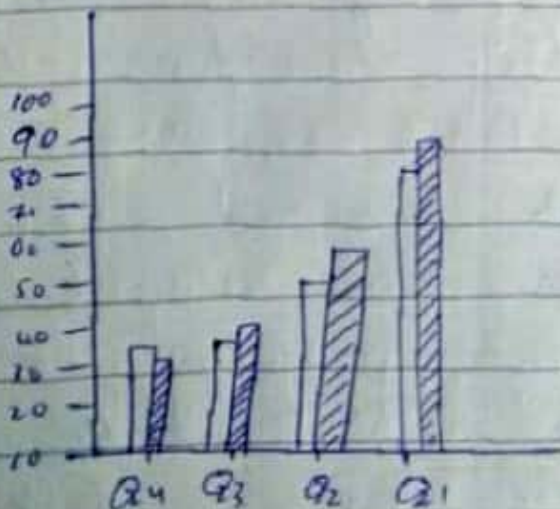
Values of mean in rice decreasing from  $Q_4$  to  $Q_1$  but in fruit and fish mean value of rice from  $Q_4$  and  $Q_1$  in men and women.

Ans(1) (D) :-

Diagram between men and women for fish.



$\Rightarrow$  For fruit :



Q10 (E) :

According to the information of the given table it shows that men need more food to maintain their energy level.

Q11 (F) :

Standard deviation  $s = \frac{\sum x}{\sqrt{n}}$

According to the mentioned formula the value of the standard deviation of men is more than in fresh vegetables, fruits, flour, total grains and meat.

The value of standard deviation is same for both men and women for remaining categories.

Q2 (3) (a) :

Find :

Rainfall	Number of years
20-24	1
25-29	3
30-34	5
35-39	8
40-44	85
45-49	52
50-54	0
55-59	1



(12)

Classes	f	x	fx
20-24	1	22	-14.8
25-29	3	27	-9.8
30-34	5	32	-4.8
35-39	8	<del>32</del> <sup>37</sup>	0.2
40-44	5	42	5.2
45-49	2	<del>42</del> <sup>47</sup>	10.2
50-54	0	52	15.2
55-59	1	57	20.2
		920	20.2

Arithmetic mean

$$A.M = \frac{\sum fx}{\sum f}$$

$$\therefore A.M = \frac{920}{25} = \boxed{36.8}$$

=> Geometric mean %

	f	x	log x
20-24	1	22	1.34
25-29	3	27	1.43
30-34	5	32	1.50
35-39	8	37	1.56
40-44	5	42	1.62
45-49	2	47	1.67
50-54	0	52	1.71
55-59	1	57	1.75
			12.58

(13)

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

$$G.M = \log \frac{12.58}{25}$$
$$= 0.5032$$

$$\text{Antilog} = 0.5032$$

$$\boxed{G.M = 3.1856}$$

⇒ Harmonic Mean %

	f	x	f/x
20-24	1	22	0.45
25-29	3	27	0.11
30-34	5	32	0.15
35-39	8	<del>42</del> 37	0.21
40-44	5	42	0.11
45-49	2	54	0.04
50-54	0	52	0
55-59	1	57	0.01
			0.76

$$H.M = \frac{25}{0.76}$$

$$\boxed{H.M = 32.76}$$



(14)

⇒ Median:

20	f	e-B	cF
20-24	1	19.5-24.5	1
25-29	3	24.5-29.5	4
30-34	5	29.5-34.5	9
35-39	8	34.5-39.5	17
40-44	5	39.5-44.5	22
45-49	2	44.5-49.5	24
50-54	0	49.5-54.5	24
55-59	1	54.5-59.5	25

$$\text{median} = Lt \ h/f \left( \frac{n}{2} - c \right)$$

$$1 = \frac{n}{2} = \frac{25}{2} = 12.5$$

median = 12.5 items

median lies in the group 35-39

$$\text{median} = 34.5 + \frac{4}{8} (12.5 - 9)$$

$$= 34.5 + \frac{4}{8} (3.5)$$

$$= 34.5 + \frac{14}{8}$$

$$= \frac{276 + 14}{8}$$

$$= 290$$

$$\text{median} = 36.25$$

⇒ mode :

20-24	1	$\begin{aligned} \text{mode} &= l + \frac{f_m - f_0}{2f_m - f_0 - f_2} \times h \\ &= 35 + \frac{(8-5)}{(2 \times 8 - 5 - 5)} \times 4 \\ &= 35 + \frac{3}{4} \times 4 \\ &= 35 + 3 \\ &= 38 \end{aligned}$
25-29	3	
30-34	5	
<b>35-39</b>	<b>8</b>	
40-44	5	
45-49	2	
50-54	0	
55-59	1	

⇒ Quantiles :

Q<sub>1</sub> :

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

$$\frac{n}{4} = \frac{\sum f}{4} = \frac{25}{4} = 6.25$$

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

$$\boxed{Q_1 = 32.75}$$

Q<sub>2</sub> :

$$Q_2 = l + \frac{h}{f} \left( \frac{n}{2} - c \right)$$

$$\frac{n}{2} = \frac{\sum f}{2} = \frac{25}{2} = 12.5$$

$$Q_2 = 34.5 + \frac{5}{5} (12.5 - 9)$$

$$\boxed{Q_2 = 37.5}$$



(16)

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

$$Q_3 = 37.5 + \frac{5}{5} (18.75 - 17)$$

$$\boxed{Q_3 = 41.25}$$

=> Deviles :

$$D_m = L + h/f \left( \frac{m \cdot n}{10} - c \right)$$

$$D = L + h/f \left( \frac{8n}{10} - c \right)$$

$$\frac{8n}{10} = \frac{8(25)}{10} = \frac{200}{10} = 20$$

using the table

$$D.8 = 37.5 + \frac{5}{5} (20 - 17)$$

$$\boxed{D.8 = 42.5}$$

=> percentile :

$$P_m = L + h/f \left( \frac{m \cdot n}{100} - c \right)$$

$$\frac{45n}{100} = 42 \left( \frac{25}{100} \right) = 11.25$$

using the table

$$P = 34.5 + \frac{5}{8} (11.25 - 9)$$

$$\boxed{P = 35.906}$$

(17)

Range:

Range	f	C-B
20-24	1	19.5-24.5
25-29	3	24.5-29.5
30-34	5	29.5-34.5
35-39	8	34.5-39.5
40-44	5	39.5-44.5
45-49	2	44.5-49.5
50-54	0	49.5-54.5
55-59	1	54.5-59.5

$$\begin{aligned} \text{Range} &= \text{largest value} - \text{smallest value} \\ &= 59.5 - 19.5 \end{aligned}$$

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

⇒ mean deviation

Classes	f	x	$x - \bar{x}$
20-24	1	22	14.8
25-29	3	27	29.4
30-34	5	32	24
35-39	8	37	1.6
40-44	5	42	26
45-49	2	47	20.4
50-54	0	52	<del>0</del>
55-59	1	57	20.2

136.2



(18)

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

$$\bar{x} = 36.8$$

$$m.D = \frac{136.4}{25}$$

$$m.D = 5.456$$

⇒ Variance :

	f	x	fx
20-24	1	22	-14.8
25-29	3	81	-9.8
30-34	5	160	-4.2
35-39	8	296	0.2
40-44	5	210	5.2
45-49	2	94	18.2
50-54	0	0	15.2
55-59	1	57	20.2
			<u>21.6</u>

$$\text{Variance} = \frac{\sum f(x - \bar{x})^2}{\sum f}$$
$$= \frac{136.4}{25} = 5.456$$

$$\text{Variance} = 21.6$$

(19)

⇒ Standard deviation:

	f	$\pi_i$	$f\pi$	$\pi - \bar{\pi}$
20-24	1	22	22	-14.8
25-29	3	27	81	-9.8
30-34	5	32	160	-4.8
35-39	8	37	296	0.2
40-44	5	42	210	5.2
45-49	2	47	94	10.2
50-54	0	52	0	15.2
55-59	1	57	57	20.2
			<u>928</u>	<u>21.6</u>

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

$$S = \sqrt{\frac{25 (21.6)}{25}}$$

$$S = \sqrt{\frac{540}{25}}$$

$$S = \sqrt{21.6}$$

$$S = 4.64$$

⇒ Coefficient of Variation

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

$$C.V = \frac{4.64}{36.8}$$

$$C.V = 0.2014$$



(20)

⇒ Skewness :

$$SK = \frac{\text{mean} - \text{mode}}{\text{standard deviation}}$$

$$S.K = \frac{36.8 - 37}{7.413}$$

$$SK = -0.026$$

(b)

⇒ Arithmetic mean :-

$$A.m \text{ } x = 1, 3, 5, 8, 5, 2, 0, 1$$

$$0, 1, 1, 2, 3, 5, 5, 8$$

$$A.m = \frac{0+1+1+2+3+5+5+8}{8}$$

$$A.m = \frac{25}{8} = 3.125$$

⇒ Geometric and harmonic mean

$$G.m = \text{Antilog} \left( \frac{1}{n} \sum \log x \right)$$

$$x = 1, 3, 5, 8, 5, 2, 0, 1$$

$$H.m = \frac{\sum x}{\sum n/x}$$

Harmonic and geometric mean is not possible because there is zero in the given data.

(21)

=> median:

$$x_{\bar{}} = \left(\frac{n+1}{2}\right)^{\text{th}}$$

$$x_{\bar{}} = \left(\frac{8+1}{2}\right)^{\text{th}}$$

$$x_{\bar{}} = 4.5^{\text{th}}$$

$$x_{\bar{}} = 4^{\text{th}} + 0.5(5^{\text{th}} - 4^{\text{th}})$$

0, 1, 1, 2, 3, 5, 5, 8

$$x_{\bar{}} = 2 + 0.5 = 2.5$$

$$x_{\bar{}} = 2.5$$

=> mode:

data is the following

1, 3, 5, 8, 5, 2, 0, 1

$$x = 1, 5$$

=> Quantiles:

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

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

$$Q_1 = \left(\frac{26}{4}\right)^{\text{th}}$$

$$Q_1 = 6.25$$

Q<sub>2</sub>:

$$Q_2 = \left(\frac{n}{4} + 1\right)^{\text{th}}$$

$$Q_2 = \left(\frac{2 \times 25}{4} + 1\right) = \frac{50+1}{4} = \frac{51}{4}$$

$$Q_2 = 12.75$$



(22)

Q31

$$Q_3 = \left(\frac{x}{4} + 1\right)^{+L}$$

$$= \left(\frac{3 \times 25}{4} + 1\right)^{+L} = \left(\frac{75+1}{4}\right)^{+L} = \left(\frac{76}{4}\right)^{+L}$$

$$Q_3 = 19$$

Q4:

$$Q_4 = \left(\frac{x}{4} + 1\right)^{+L}$$

$$Q_4 = \left(\frac{11 \times 25}{4} + 1\right)^{+L} = \left(\frac{100+1}{4}\right)^{+L}$$

$$Q_4 = 25 \cdot 25$$

=) Deciles

D1:

$$D_1 = \left(\frac{x}{10} + 1\right)^{+L}$$

$$D_1 = \left(\frac{25}{10} + 1\right)^{+L} = \left(\frac{26}{10}\right)^{+L}$$

$$D_1 = 2.6$$

=) D2:

$$D_2 = \left(\frac{x}{10} + 1\right)^{+L}$$

$$= \left(\frac{2 \times 25}{10} + 1\right)^{+L} = \left(\frac{50}{10} + 1\right)^{+L}$$

$$= \left(\frac{51}{10}\right)^{+L} = 5.1$$

=) D3:

$$D_3 = \left(\frac{x}{10} + 1\right)^{+L}$$

$$= \left(\frac{3 \times 25}{10} + 1\right)^{+L} = \left(\frac{75}{10} + 1\right)^{+L}$$

$$D_3 = 8.5$$

(23)

$\Rightarrow D_4$

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

$$D_4 = \left( \frac{4 \times 25 + 1}{40} \right) \cdot tL$$

$$D_4 = \left( \frac{100 + 1}{10} \right) \cdot tL = \left( \frac{101}{10} \right) \cdot tL$$

$$\boxed{D_4 = 10.1}$$

$\Rightarrow$  percentiles

$$P = m \left( \frac{n+1}{100} \right) \cdot tL$$

$\Rightarrow$   $P_1$

$$P_1 = \left( \frac{n}{100} + 1 \right) \cdot tL$$

$$= \left( \frac{25}{100} + 1 \right) \cdot tL$$

$$= \left( \frac{26}{100} \right) \cdot tL$$

$$\boxed{P_1 = 0.26}$$

$\Rightarrow$   $P_2$

$$P_2 = \left( \frac{n}{100} + 1 \right) \cdot tL$$

$$P_2 = \left( \frac{2 \times 25}{100} + 1 \right) \cdot tL$$

$$P_2 = \left( \frac{50}{100} + 1 \right) \cdot tL = \left( \frac{51}{100} \right) \cdot tL$$

$$\boxed{P_2 = 0.51}$$



(24)

$$\begin{aligned} P_3 &= \left(\frac{x}{100} + 1\right)^{fk} \\ &= \left(\frac{3 \times 25}{100} + 1\right)^{fk} = \left(\frac{75}{100} + 1\right)^{fk} \\ &= \left(\frac{76}{100}\right)^{fk} = \boxed{0.76} \end{aligned}$$

=>  $P_4$

$$\begin{aligned} P_4 &= \left(\frac{n}{100} + 1\right)^{fk} \\ P_4 &= \left(\frac{100}{100} + 1\right)^{fk} = \left(\frac{100}{100} + 1\right)^{fk} \\ P_4 &= \left(\frac{100}{100}\right)^{fk} \\ \boxed{P_4} &= \boxed{1.01} \end{aligned}$$

=> Range :

Range = maximum - minimum

$$\text{Range} = 8 - 0$$

$$\boxed{\text{Range} = 8}$$

=> mean deviation

$$M.D = \frac{\sum (x - \bar{x})}{n} = \bar{x} = 3.125$$

$x$	$x - \bar{x}$
1	2.125
3	0.125
5	1.875
8	4.875
5	1.875
2	1.125
0	3.125
1	2.125
	<hr/>
	17.25

$$M.D = \frac{17.25}{8}$$

$$\boxed{M.D = 2.156}$$

(25)

=) Quartile deviation:

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

$$Q.D = \frac{5 - 1}{2}$$

$$Q.D = \frac{4}{2}$$

$$Q.D = 2$$

=) Variance

$x$	$x^2$
1	1
3	9
5	25
8	64
5	25
2	4
0	0
$\frac{1}{25}$	$\frac{1}{129}$

$$S^2 = \frac{129}{8} = \left(\frac{25}{8}\right)^2$$

$$S^2 = 16.125 - 9.766$$

$$S^2 = 6.359$$

=) standard deviation

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

$$S = \sqrt{\frac{129}{8} - \left(\frac{25}{8}\right)^2}$$

$$S = \sqrt{6.359}$$

$$S = 2.521$$



26

⇒ skewness

$$SK = 3 \frac{(\text{mean} - \text{median})}{s}$$

$$SK = 3 \frac{(3.125 - 2.5)}{5} = \frac{3 \times 0.625}{5}$$

$$SK = 0.45$$

The end