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Paper Biostatistic

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Exam Mid Term

IQRA NATIONAL UNIVERSITY.

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Question No : 01

Answer :-

	Men sample size					1308	Women 1540			
	Q_4 Men	Q_3 Men	Q_2 Men	Q_1 Men	S.E	Q_4	Q_3	Q_2	Q_1	S.E
Freshveg	204	259	266	317	0.9	178	275	266	304	0.3
Fruit	31	45	69	105	0.5	28	46	70	121	0.4
Rice	361	331	269	246	1.0	315	276	243	220	0.8
White flour	79	114	197	253	1.0	56	118	141	180	0.8
White grain	2	2	6	27	1.0	1	3	6	22	0.1
Root veg	7	11	16	29	0.1	6	12	17	28	0.1
Meat	70	61	69	77	0.4	48	43	54	63	0.3
Fish	23	28	31	44	0.2	19	21	28	46	0.2
Milk	2	23	23	39	0.3	1	4	15	48	0.3
Σ =	785	860	968	1137		Σ = 652	Σ = 758	Σ = 845	Σ = 1032	

Part (A)

Formula for over all Mean:

// $\text{Mean} = \frac{\Sigma \bar{x}_i}{n}$

// $\text{Mean} = \frac{3748}{36} = 104.11$

- overall for Men = 104.11

- Now finding overall Men for Women

Formula for overall Mean.

" Mean = $\frac{\Sigma \bar{x}_i}{n}$

" $\frac{3282}{36}$ = 91.16

" Mean = 91.16

Overall Mean for Women = 91.16

&

↳ Finding combined mean for men & Women for fresh vegatable, rice, Meat etc.

Mean = $\frac{\Sigma \bar{x}_i}{n}$ = $\frac{5027}{32}$

Mean = 157.09

Hence combined mean for Men & women is 157.09.

XXX ____ XXX ____ XXX ____ XXX

Q. No: 01 - PART (B)

- Consumption of milk for both men and women are low in Q_3 & Q_4 but it is sharply comrise in Q_1 & Q_2.
  - Fresh vegetable consumption is very low in Q_3 & Q_4 but it is sharply rise in Q_1 & Q_2.
- Consumption of what flous for both men & women is very low in Q_3 & Q_4, but it is rise in Q_1 & Q_2.

Q. No: 01 PART-(C)

- Consumption of rice fall, for both men & women.
- Consumption of fruits rises, for both men & women.
- Consumption of all fish, also fall, for both men & women.

Q No: 01 PART-(E)

Group	Men Q4	Women Q1
Fresh veg	204	304
Fruit	31	121
Rice	367	202
Weat flous	79	180
Meat	70	63
Fish	23	48

⇓ These are a very large difference in pattern of consumption.

⇓ Men eat more meat & rice & women flous and fish.

Q.No:01 . PART-(F)

Standerd deviation of whole grain and root vegatable, for men & women is very low/less, therefore root vegatable & grain whole result is best.

XXX_____XXX_____XXX

Q: 3

Rain fall (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

Classes	(f)	x	fx	flogx	f/x	C.f
20–24	1	22	22	1.34	0.045	1
25–29	3	27	81	4.29	0.11	4
30–34	5	32	160	7.52	0.15	9
35–39	8	37	296	12.54	0.21	17
40–44	5	42	210	8.11	0.119	22
45–49	2	45	94	3.34	0.042	24
50–54	0	52	0	0	0	24
55–59	1	57	57	1.75	0.017	25
	$\Sigma=25$		$\Sigma=920$	$\Sigma=38.92$	$\Sigma=0.708$	

(PART = 9)

9) Formula for Arthmetic Mean:-

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

$$A.M = \frac{920}{25}$$

$$\boxed{A.M = 36.8.}$$ Ans.

Formula for G.M :-

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

$$G.M = \text{antilog}\left(\frac{38.92}{25}\right)$$

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

$$\boxed{G.M = 35.48 \quad \text{Ans.}}$$

Formula for H.M :-

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

$$H.M = 25/0.708$$

$$\boxed{H.M = 35.31 \quad \text{Ans}}$$

Now for Median:

Classes	f	C.B	C.f.
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

Formula for Median :-

$$\text{Median} = l_1 + {}^{h}/_{f}\left({}^{n}/_{2} - c.f\right)$$

Now

$${}^{n}/_{2} = \frac{\Sigma f}{2}$$

$$= {}^{25}/_{2}$$

$$= 12.5$$

$l_1 = 34.5$, $l_2 = 39.5$, $h = 5$, $f = 8$, $c.f = 9$.

putting the value.

$$\text{Median} = 34.5 + {}^{5}/_{8}(12.5 - 9)$$

$$= 34.5 + 2.1875$$

$$\text{Median} = \boxed{36.68} \quad \text{Ans.}$$

Formula for Mode :-

$$\text{Mode} = l_1 + \frac{f_m - f_0}{2f_m - f_0 - f_1} \times h$$

we see in model group.

$l_1 = 34.5$, $l_2 = 39.5$, $h = 5$, $f_m = 8$,

$f_0 = 5$ and $f_1 = 5$

putting value in formula.

$$\text{Mode} = 34.5 + \frac{8-5}{2(8)-5-5} \times 5$$

$$= 34.5 + \frac{3}{16-10} \times 5$$

$= 34.5 + 15/6$

Mode = **37** Ans.

Formula for Quartiles :-

$$Q_i = i\left(\frac{n+1}{4}\right)$$

for $i = 1, 2, 3$

$$Q_1 = l_1 + \frac{h}{f}\left\{\left(\frac{n+1}{4}\right) - C.f\right\}$$

$$\frac{n+1}{4} = \frac{37+1}{4} = \frac{25+1}{4} = \frac{26}{4} = 6.5$$

$l_1 = 29.5$, $l_2 = 34.5$, $h = 5$, $f = 5$, $C.f = 4$

putting value.

$$Q_1 = 29.5 + \frac{5}{5}(6.5 - 4)$$

$$Q_1 = 29.5 + 1(2.5)$$

$$Q_1 = 32 \text{ Ans}$$

For Q_2 Now Q_2 = Median.

Now

For $Q_3 = l_1 + \frac{h}{f}\left(3\left(\frac{n+1}{4}\right) - C.f\right)$

$$= 3\left(\frac{n+1}{4}\right) = 3\left(\frac{37+1}{4}\right) = 3\left(\frac{25+1}{4}\right)$$

$$= 3\left(\frac{26}{4}\right)$$

$$= 19.5$$

$l_1 = 39.5$, $l_2 = 44.5$, $h = 5$, $f = 5$, $C.f = 17$.

putting value.

$$Q_3 = 39.5 + \frac{5}{5}(19.5 - 17)$$

$Q_3 = 42$ Ans.

Formula for Decile :-

" $D_r = l_1 + h/f\left(\frac{rn}{10} - c.f\right)$

" For $r = 1, 8$

" $D_1 = l_1 + h/f\left(\frac{n}{10} - c.f\right)$

" $\frac{n}{10} = \frac{\Sigma f}{10} = \frac{25}{10} = 2.5$

" $l_1 = 24.5$, $l_2 = 29.5$, $f = 3$, $c.f = 1$

Puting value.

" $D_1 = 24.5 + 5/3\ (25 - 1)$.

" $D_1 = 27$.

" For D_8.

Formula for percentile :-

" $P_r = l_1 + h/f\left(\frac{rn}{100} - c.f\right)$

" Now $rn = \frac{r\Sigma f}{100}$

for $r = 1, 2, 3 \ldots\ldots 100$

" We find P_{15}, P_{54}, and P_{89}.

" $P_{15} = l_1 + h/f\left(\frac{15n}{100} - c.f\right)$.

" $\frac{15n}{100} = \frac{15\Sigma f}{100} = \frac{15 \times 25}{100} = 3.75$

Now $P_{54} = l_1 + h/f\left(\frac{54n}{100} - cf\right)$.

Now $54\left(\frac{25}{100}\right) = 13.5$

$P_{54} = 34.5 + 5/8\,(13.5 - 9)$

$= 34.5 + 2.8125$

$P_{54} = 37.3125$ Ans.

For P_{89}.

$P_{89} = l_1 + h/f\left(\frac{89n}{100} - cf\right)$.

$\frac{89n}{100} = \frac{89 \times 25}{100} = 22.25$

$P_{89} = 44.5 + 5/2\,(22.25 - 22)$.

$= 44.5 + 2.5\,(0.25)$

$\boxed{P_{89} = 45.25}$ Ans.

Formula for Quartile Deviation :-

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

$Q.D = \frac{42 - 32}{2}$

$= 10/2$

$\boxed{Q.D = 5}$ Ans.

Formula for M. D :-

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

$M.P = 136/25 = 5.44$

$\boxed{M.D = 5.44}$ Ans.

x	f	$f\lvert x-\bar{x}\rvert$	$f(x-\bar{x})^2$
22	1	14.8	219.04
27	3	24.4	288.12
32	5	24	115.2
37	8	1.6	0.32
42	5	26	135.2
47	2	20.4	20.4
52	0	0	0
57	1	20.2	0
	$\Sigma = 25$	$\Sigma = 136$	405.04
			$\Sigma = 1685.68$

Formula for Var ⇒

$$Var = \frac{\Sigma f (x-\bar{x})^2}{\Sigma f}$$

$$\therefore Var = \frac{1685.68}{25}$$

$$= 67.42$$

$$S.D = \sqrt{67.42}$$

$$\boxed{S.D = 8.210 \quad \text{Ans.}}$$

Now

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

$$C.V = \frac{8.210}{35.8} \times 100$$

$$\boxed{C.V = 22.30 \quad \text{Ans}}$$

" SK = $\frac{\text{Mean} - \text{Mode}}{\text{S.D}}$

" $\frac{36.8 - 37}{8.210}$

" S.K. = $\boxed{-0.024}$ Answer

(PART = B).

For ungroup Data.

x	$\log x$	$1/x$	x^2	$\lvert x - \bar{x} \rvert$
22	1.34	0.04	22	15.58
27	1.43	0.03	729	10.58
32	1.50	0.031	1024	5.58
37	1.56	0.02	1369	0.58
42	1.62	0.023	1764	4.42
47	1.67	0.021	2209	9.42
52	1.71	0.091	2704	14.42
57	1.75	0.017	3249	14.42
$\Sigma = 316$	$\Sigma = 12.6$	$\Sigma = 0.222$	$\Sigma = 13070$	$\Sigma = 80$

For Arithmetic Mean:-

" $AM = \frac{\Sigma x}{n}$

$= 316/8$

" A.M = 39.5 Answer

For G.M ⇒

" $G.M = \text{anti}\left(\frac{\Sigma \log x}{n}\right)$

$= \text{anti}\left(\frac{12.06}{8}\right)$ = $\boxed{37.58}$ Answer

For H.M Formula:-

$$H.M = n / \Sigma 1/x$$

$$= 8 / 0.222$$

$$H.M = \boxed{36.03} \quad \text{Ans.}$$

Formula for Median :-

$$\text{Median} = (n/2)^{th} = (8/2)^{th} = 4th$$

$$\text{Median} = \boxed{37 \text{ Ans.}}$$

In this case Mode = 0

Formula for Quartile :-

$$Q_r = r(n+1/4)$$

$$r = 1, 2, 3$$

$$Q_1 = 1(8+1/4) = (9/4)^{th} = 2.25 th.$$

$$Q_1 = 2 + 0.25(3-2)$$

$$= 25 + 0.25(32-27)$$

$$\boxed{Q_1 = 28.25} \quad \text{Ans.}$$

For Q_3

$$Q_3 = 3(n+1/4) = 3(8+1/4) = 3(9/4)$$

$$(27/4)^{th} = 6.75 th.$$

$$Q_3 = 6 + 0.75(7-6)$$

$Q_3 = 47 + 0.75(52-47)$

$Q_3 = 47 + 0.75(5)$

$Q_3 = \boxed{50.75}$

Formula for Decile:

$D_r = r\left(\frac{n+1}{10}\right)^{th}$

$r = 1, 6, 9$

$D_1 = 1\left(\frac{8+1}{10}\right) = \frac{9}{10} = 0.9$

$D_1 = 0.9(22)$

$= \boxed{19.8}$ Ans.

For D_6

$D_6 = 6\left(\frac{n+1}{10}\right) = \frac{6(8+1)}{10} = \frac{6(9)}{10}$

$= 5.4^{th}$

$D_6 = 42.04(47-42)$

$D_6 = 42 + 0.4(5)$

$D_6 = \boxed{44}$ Ans.

For D_9

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

$= 9\left(\frac{8+1}{10}\right)$

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

$= \frac{81}{10}$

$= 8.1th$

$D_9 = 8 + 0.1(9-8)$

$D_9 = 57 + 0.1(1)$

$D_9 = \boxed{57.1}$ Ans.

Formula for Percentile -

$$P_r = r(n+1/100)^{th}$$

For = $r = 1, 2, 3 \ldots 100$

Now we find P_3 and P_{75}.

$$P_3 = r(n+1/100)$$
$$= 3(8+1/100)$$
$$= 27/100$$

$$\boxed{P_3 = 0.27}$$

Formula for P_{75}.

$$P_{75} = 75(n+1/100)$$
$$= 75(8+1/100)$$
$$= 75(9/100)$$
$$= 6.75$$

$$P_{75} = 6 + 0.75(7-6)$$
$$= 45 + 0.75(52-47)$$
$$P_{75} = 47 + 0.75(5)$$
$$P_{75} = \boxed{50.75} \text{ Ans.}$$

Range = ?

$$\text{Range} = L - S$$
$$= 57 - 22$$
$$= 35 \text{ Ans.}$$

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

" $Q.D = \frac{50.75 - 28.25}{2}$

" $Q.D = 11.25$ Ans.

Formula for M.D:-

" $M.D = \frac{\Sigma |x - \bar{x}|}{n}$

$= 80/8 = 10$

" M.D = 10 Ans.

formula for Var:-

" $Var = \frac{\Sigma x^2}{n} - \left(\frac{\Sigma x}{n}\right)^2$

$= \frac{13070}{8} - \left(\frac{316}{8}\right)^2$

" $Var = 1633.75 - (39.5)^2$

$= 1633.75 - 1560.25$

" $Var = 73.5$

Now

$S.D = \sqrt{73.5}$

$= 8.57$

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

$= \frac{8.57}{39.5} \times 100$

C.V = 21.69 Ans.

Skewness :-

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

$$= \frac{39.5 - 0}{8.57}$$

$$= \frac{39.5}{8.57}$$

$$\boxed{S.K = 4.60 \text{ Ans.}}$$

Q. No: 2

PART - (A) :-

⇒ The purpose of census is to know the exact figure of population living in the said country. In census a country will know the living standard of their people. Census report helps for policy maker, because future needs & budget allocation totally depends on this.

PART - (B) :-

⇒ In sample survey, only a part of population is selected and considered these results as approximation of population.

⇒ In census the whole data is under consideration.

⇒ In census we study each and everything / every element in the population, while sample survey, and agencies survey their limited sample data collected.

PART - (C) :-

↳ Out of 100%., the 94% response rate shows that the online courses have nearer to accuracy.

PART - (D) :-

↳ Since "Jedi k night" is not in any real sense people do not always take census seriously. This may therefore cast doubt on the accuracy of other responses they give.

↳ It may also indicates a contempt for, or a distrast of government and the collection of data by government agencies.

↳ While this example indicates that not all responses can be taken seriously, there still be value in asking question.

PART-(E) :-

↳ The potential problem in conducting the 2021 UK census online is accuracy, time & engagement.

↳ In online census their is limitation of accurate data.

↳ Collection from the masses, to overcome this a oath should be taken.

↳ To overcome the time spending on the data collection, there must be specified time given for completion.

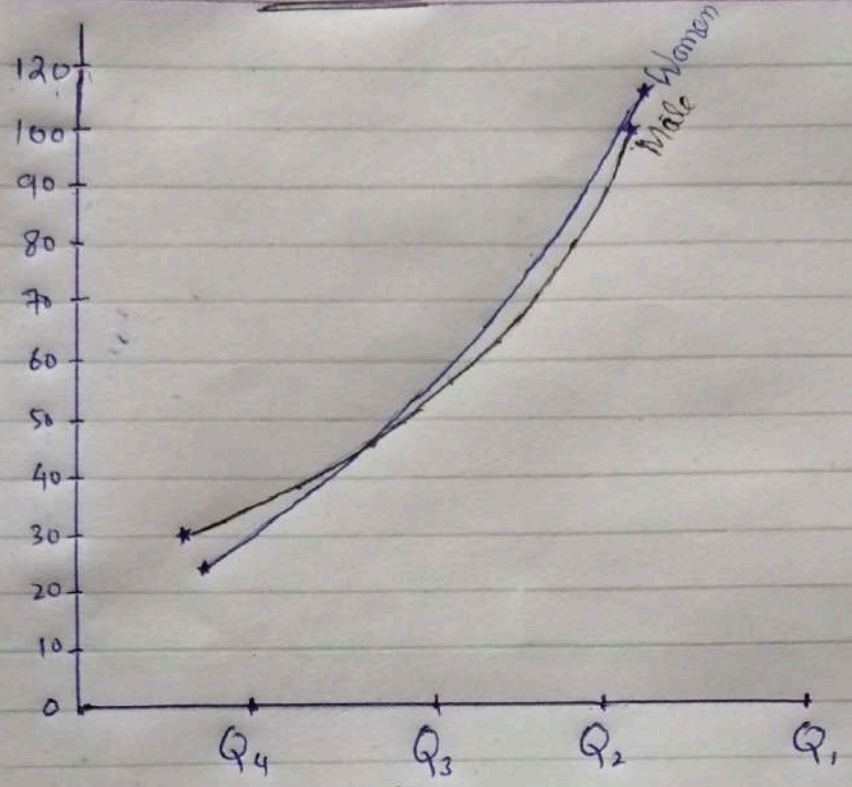
PART-(F) :-

Whoneves we add additional data in over sample size, it gives more accurate data and the data become reliable. But incorporating the additional data is not easy to takle. For this help of highly expert statician should be taken.

XX ——— XX XX ——— XXXX ——— XXXX

Q: 2 Part = D

FRUITS



FISH :