

Name: Sameen jan

Id: 13714

Paper Biostatistics

Examination: med

Submitted to

Sir Anwar Shamim

QUESTION No 1

Ans

Men Sample Size 1308

	Q1 Mean	Q2 Mean	Q3 Mean	Q4 Mean	S.E
Fresh Veg. 204	259	266	317	0.9	
Fruit 31	45	69	105	0.5	
Rice 367	337	269	246	1.0	
Wheat flour	114	197	253	1.0	
Whole grain ⁷⁹	2	6	27	0.1	
Root veg 7	11	16	29	0.1	
Meat 70	61	69	77	0.4	
Fish 28	28	31	44	0.2	
Milk 2	3	23	39	0.3	
	$\Sigma = 785$	$\Sigma = 860$	$\Sigma = 966$	$\Sigma = 1137$	

Women 1540

	Mean Q_4	Mean Q_3	Mean Q_2	Mean Q_1	S.E
Fresh Veg.	178	235	266	304	0.8
Fruit	28	46	70	121	0.4
Rice	315	276	243	220	0.8
Wheat flour.	56	118	141	180	0.8
Whole grain.	1	3	6	22	0.1
Root veg.	6	12	17	28	0.1
Meat	48	43	54	63	0.3
Fish	19	21	28	46	0.2
Milk	1	4	15	48	0.3

$\Sigma = 1552$

$\Sigma = 758$

$\Sigma = 840$

$\Sigma = 1032$

a)

Formula For Overall
Mean For Men.

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

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

Overall Mean for Men

$$= 104.11$$

Now finding Overall Mean
for Women.

Formula for Overall Mean:

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

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

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$$\text{Mean} = 91.16$$

Over all Mean for Women
= 91.16

Now finding Combined Mean
for Men and Women
for fresh veg. Rice. Fish
and Meat.

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

$$\text{Mean} = 157.09$$

Hence Combined Mean for
Men and women is = 157.09

Q No 1

PART B

Describe in words what the figure 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 in Q₁ and Q₂

* Consumption of wheat for both men and women is very low in Q₃ and Q₄ but it is rise

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Sharply in Q_1 and Q_2 .

Q : No 1

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 .

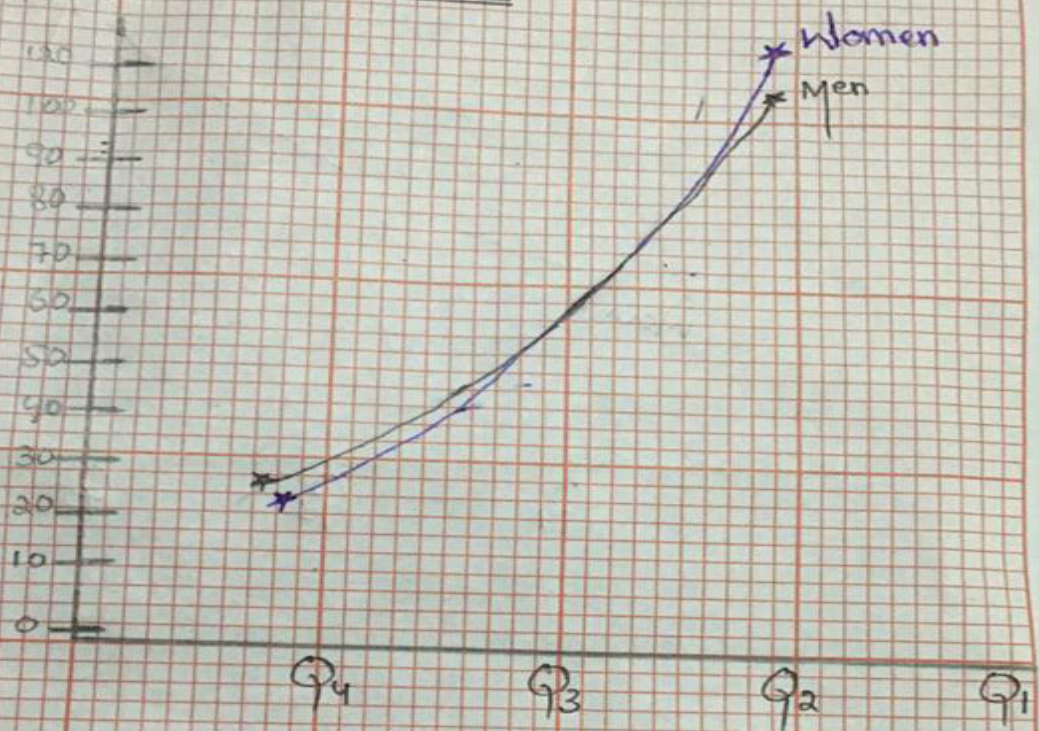
* Consumption of rice fall, for both men and women

* Consumption of fruits rises for both men and women

* Consumption of fish also fall for both men and women

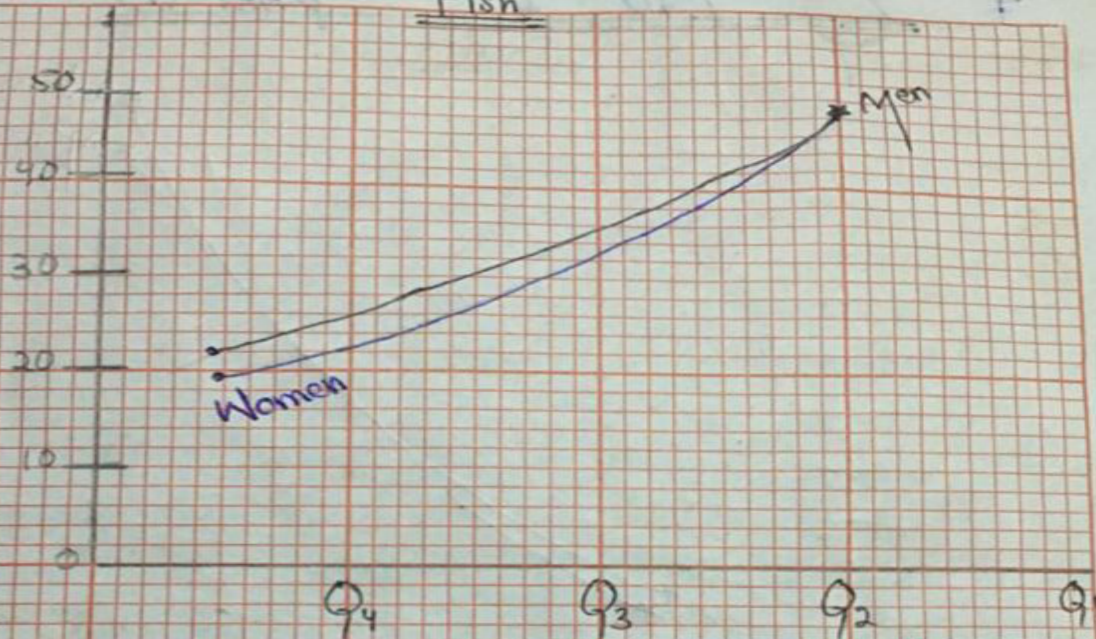
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Q No 1 PART D
Fruits



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Fish



Q No 1

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 Q4	Women Q1
Fresh Veg	204	304
Fruits	31	121
Rice	367	202
Wheat flour	79	180
Meat	70	63
Fish	23	48

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there are very large
differences in pattern of
consumption

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

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f) Standard derivation of
whole grain and Root
vegetable for men and
women is very less.
therefore root vegetable
and grain whole result
is best.

QUESTION NO "2"

ANS:-

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 policy maker because future needs and budget allocation totally depends on this.

PART B

In Sample Survey only a part of population is selected

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and Considered these results as approximates of population.

In Census the whole data is Under Consideration. In Census we Study each and every element in the population while Sample Survey and agencies Survey their is limited Sample of data is Collected.

PART C

Out of 100%, the 94% response rate Shows that the Online Census have nearest to accuracy.

PART D

Since 'Jedi Knight' is not in any real sense a religion.

This indicates that people do not always take the Census seriously.

This may therefore cast doubt on the accuracy of other responses they give.

It may also indicate a contempt for, or a distrust of government and the collection of data by government agencies.

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

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For example, the 2011 Census
quantified the decline in
Christianity and the rise
in Islam: these are likely
to be real phenomena.

PART E

The potential problems in conducting the 2021 UK Census Online is accuracy, time and engagement.

In Online Census there is limitation of accurate data collection from the masses. To overcome this a oath should be taken.

To overcome the time spending.

PART F

When ever we add additional data in our sample size, it gives more accurate data become reliable. But incorporating the additional data is not easy to tackle. For this

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help of 'highly' expert Statistician
Should be taken.

17/11/21

QUESTION No "3"

ANS-

9) Formula For A.M

$$A.M = \frac{\sum fX}{\sum f} = \frac{930}{25} = 36.8$$

Now

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

Formula For G.M

$$G.M = \text{anti log} \left\{ \frac{\sum f \log X}{\sum f} \right\}$$

$$= \text{anti log} \left(\frac{38.92}{25} \right)$$

$$G.M = \text{anti log} (1.557)$$

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

Formula For H.M :-

$$H.M = \frac{\sum f}{\sum \frac{f}{x}} = \frac{25}{0.708} = 35.31$$

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

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:-

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

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

Putting the values in formula

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

$$= \text{Median} = 34.5 + 2 \cdot 1875$$

Median 36.68 Ans.

Formula For Mode s-

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

We see in modal group.

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

$$f_2 = 5, f_1 = 5$$

Putting the values in formula-

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

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

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$$= 34.5 + \frac{15}{6}$$

$$\text{Mode} = 37 \text{ Ans}$$

Formula For Quartiles-

$$Q_r = l_r + \frac{h}{f} \left\{ \frac{n+1}{4} - c.f \right\}$$

$$f_r \quad r=1, 2, 3.$$

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

$$\frac{n+1}{4} = \frac{8f+1}{4} = \frac{25+1}{4} = \frac{26}{4} = 6.5$$

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

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

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

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

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For now Q_2 Now $Q_2 = \text{Median}$

$$\text{For } Q_2 = l_1 + \frac{h}{f} \cdot 3 \left(\frac{n+1}{4} \right) - c.f$$

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

$$= 3 \left(\frac{25+1}{4} \right) = 3 \left(\frac{26}{4} \right)$$

$$= 19.5$$

$$l_1 = 39.5, l_2 = 44.5, h = 5, f = 5,$$

$$c.f = 17$$

$$Q_2 = 39.5 + \frac{5}{5} (19.5 - 17)$$

$$Q_2 = 42 \text{ Ans}$$

Formula For Deciles:-

$$D_x = l_1 + \frac{h}{f} \left(\frac{xn}{10} - c.f \right)$$

$$\text{For } x = 1, 8$$

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

$$\frac{n}{10} = \frac{\sum f}{10} = \frac{25}{10} = 2.5$$

$$l_1 = 24.5, \quad b = 39.5, \quad f = 3 \\ c.f = 1$$

$$D_1 = 24.5 + \frac{5}{3} (2.5 - 1)$$

$$D_1 = 27$$

For D_8

$$D_8 = l_1 + \frac{h}{f} \left(\frac{8n}{10} - c.f \right)$$

$$D_8 = 8 \left(\frac{25}{10} - c.f \right) = 20$$

$$D_8 = 39.5 + \frac{5}{5} (20 - 17)$$

$$D_8 = 42.5 \text{ Ans.}$$

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Formula For Percentile:-

$$\hat{P}_x = l_1 + \frac{h}{f} \left(\frac{xn}{100} - c.f \right)$$

$$\text{Now } xn = x \frac{\Sigma f}{100}$$

$$\text{For } x = 1, 2, 3 = 990$$

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

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

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

$$P_{15} = 24.5 + \frac{5}{3} (3.75 - 1)$$

$$= 24.5 + 2.7$$

$$P_{15} = 27 - 2.5 \text{ Ans}$$

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

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

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$$P_{54} = 34.5 + \frac{5}{8} (13.5 - 9) \\ = 34.5 + 2 \cdot 8.125$$

$$P_{54} = 37 \cdot 3125$$

For P_{89}

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

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

$$P_{89} = 44.5 + \frac{5}{2} (22.25 - 22) \\ = 44.5 + 2.5 (0.25)$$

$$P_{89} = 45.125 \text{ Ans.}$$

Formula For Range-

$$\text{Range} = L - S$$

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

Formula For Q.D :-

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

$$Q.D = \frac{42 - 32}{2} = \frac{10}{2} = 5$$

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

Formula For M.D :-

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

$$M.D = \frac{136}{25} = 5.44$$

$$M.D = 5.44$$

x	f	$Hx - \bar{x}$	$f(x - \bar{x})^2$
22	1	14.8	219.04
27	3	29.4	288.12
32	5	24	115.2
37	8	1.6	0.32
42	5	26	135.2
47	2	30.4	20.4

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52	0	0	0
57	1	30.2	0

$$\Sigma = 136 \quad 408.04$$

$$\Sigma = 1685.68$$

Formula For Var :-

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

$$\text{Var} = \frac{1685.68}{25} = 67.42$$

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

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

Now

$$\text{C.V} = \frac{\text{S.D}}{M} \times 100$$

$$\text{C.V} = \frac{8.210}{36.8} \times 100$$

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

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SkewnessFormula For SK:-

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

$$SK = \frac{36.8 - 37}{8.210}$$

$$SK = -0.024$$

Q No "2" part "b"

For ungrouped data:-

x	$\log x$	$1/x$	x^2	$x - \bar{x}$
22	1.34	0.04	32	15.58
27	1.43	0.03	789	-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	0.019	2704	14.42
57	1.75	0.017	3249	14.42

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$$\Sigma = 316 \quad \Sigma = 12.6 \quad f = 0.222 \quad \Sigma = 13070 \quad \Sigma = 80 \\ A.M = 39.5$$

Formula For G.M :-

$$G.M = \text{anti} \left(\frac{\Sigma \log H}{n} \right) \\ = \text{anti} \left(\frac{12.6}{8} \right)$$

$$G.M = 37.58 \text{ Ans}$$

Formula For H.M :-

$$H.M = \frac{n}{\Sigma \frac{1}{H}} = \frac{8}{0.222} = 36.03$$

$$H.M = 36.03$$

Formula For Median :-

$$\text{Median} = \left(\frac{n}{2} \right)^{H_2} = \left(\frac{8}{2} \right)^{H_2} = 4^{H_2}$$

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

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In this case Mode = 0

Formula For Quartiles-

$$Q_r = r \left(\frac{n+1}{4} \right) \quad r = 1, 2, 3$$

$$Q_r = 1 \left(\frac{8+1}{4} \right) = \left(\frac{9}{4} \right)^{H_2} = 2.25^{H_2}$$

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

$$Q_1 = 27 + 0.25 (32 - 27)$$

$$Q_1 = 28.25$$

Formula For Q_3

$$Q_3 = 3 \left(\frac{n+1}{4} \right) = 3 \left(\frac{8+1}{4} \right) = 3 \left(\frac{9}{4} \right)$$

$$\left(\frac{27}{4} \right)^{H_1} = 6.75^{H_1}$$

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

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

$$Q_3 = 47 + 0.75 (5)$$

$$Q_3 = 50.75$$

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Formula For decile:-

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

$$r = 1, 2, 3, 9$$

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

$$D_1 = 9 + 0.9 (1-9)$$

$$D_1 = 0.9 (22)$$

$$D_1 = 19.8 \text{ Ans.}$$

For D_6

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

$$= 5.4 + 4$$

$$D_6 = 5 + 0.4 (6-5)$$

$$D_6 = 42 + 0.4 (47-42)$$

$$D_6 = 42 + 0.4 (5)$$

$$D_6 = 44 \text{ Ans}$$

For D_9

$$D_9 = 9 \left(\frac{n+1}{10} \right) = 9 \left(\frac{8+1}{10} \right) = \frac{9(9)}{10}$$

$$\frac{81}{10} = 8.1 + h$$

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

$$D_9 = 8.1 + 0.1(1)$$

$$D_9 = 8.2 \approx 8.2$$

Formula For Percentiles-

$$P_r = r \left(\frac{n+1}{100} \right)^{\text{th}}$$

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

Now we find P_3, P_4, P_5, P_75

$$P_3 = r \left(\frac{n+1}{100} \right) = 3 \left(\frac{8+1}{100} \right) = \frac{27}{100}$$

$$P_3 = 0.27$$

$$\Rightarrow 8 + 0.27(1)$$

$$\Rightarrow 8 + 0.27(1)$$

$$P_3 = 8.27$$

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Formula For P₄₅

$$P_{45} = 45 \frac{(n+1)}{100} = 45 \frac{(8+1)}{100} = \frac{45(9)}{100}$$

$$\Rightarrow 4.05$$

$$4 + 0.5(5-4)$$

$$= 4 + 0.5(42 - 37)$$

$$P_{45} = 37 + 0.5(5) = 39.5$$

Formula For P₇₅ :-

$$P_{75} = 75 \frac{(n+1)}{100} = 75 \frac{(8+1)}{100}$$

$$= \frac{75(9)}{100}$$

$$= 6.75$$

Now

$$P_{75} = 6 + 0.75(7-6)$$

$$= 6 + 0.75(52 - 47)$$

$$P_{75} = 6 + 0.75(5)$$

$$P_{75} = 50.75 \text{ Ans}$$

