Assignment 1

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20241068 sec:09

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1. (a) 10 variables.

(ii) Qualitative: 5 variables.

Transmissom, Fuel, Vehicle class, Model, Model year.

Quantitative : 5 variables:

Engine size, Cylinders, Number of gears, City MPG, Hwy MPG.

1. (b)

Vehicle class	Frequency
Small SUV	2
Large car	1
Small car	2
Mid size car	3
Standard SUV	2

Total => 10

∴ So proportion of mid size car is => $3/10$

[Ans]

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1. (d)

City MPG	Tally	Frequency	Relative Frequency	Cumulative Relative Frequency
10-15	11	2	2/10 → .2	.2
15-20	111	3	3/10 → .3	.5
20-25	111	3	3/10 → .3	.8
25-30	11	2	2/10 → .2	1

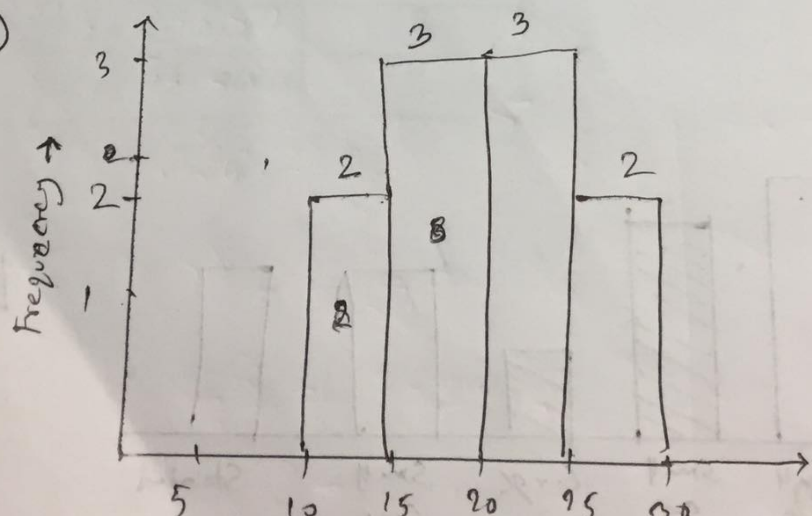
(i) Proportion of vehicles has milage between 10-20 MPG

$$\Rightarrow \frac{5}{10} \times 100 \Rightarrow 50\%$$

(ii) Proportion of vehicles has mileage better than 20.

$$\rightarrow \frac{5}{10} \times 100 \Rightarrow 50\%$$

(iii)



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3.

Class	Tally	Frequency (f_i)	Cumulative Frequency	Relative Frequency	Mid value (u_i)	$f_i u_i$
85-95	卌 卌 卌	15	15	$\frac{15}{50} \Rightarrow 0.3$	90	1350
95-105	卌 卌 卌 ||	12	32	$\frac{12}{50} \Rightarrow 0.34$	100	1200
105-115	卌 卌 ||	12	44	$\frac{12}{50} \Rightarrow 0.24$	110	1320
115-125	卌 |	6	50	$\frac{6}{50} \Rightarrow 0.12$	120	720
Total		50				5690

(1).

$$\text{Median} = \frac{L_0 + n/2 - F_{me}}{F_{me}} \times w_{me}$$

$$= 95 + \frac{25-15}{12} \times 10$$

$$\Rightarrow 100.89$$

$$\text{Mode} = L_0 + \left\{ \frac{f_0 - f_1}{(f_0 - f_1) + (f_0 - f_1)} \right\} \times w$$

$$\Rightarrow 95 + \frac{12-15}{(12-15)+(12-12)} \times 10$$

$$= 97.86$$

So

$$\text{Mean} \Rightarrow \frac{5090}{50} \Rightarrow 101.8$$

[Ans]

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(3).

Income groups.	firms	Avg N of workers	Mid value x_i	Total workers f_i	$f_i x_i$
800-1000	45	12	900	540	486000
1000-1200	37	16	1100	592	651200
1200-1400	27	6	1300	162	210600
1400-1600	30	9	1500	270	405000
1600-1800	41	7	1700	287	487900

$\Sigma f_i \Rightarrow 1851$ $\Sigma f_i x_i = 2240700$

$\therefore$ Mean salary $\Rightarrow \bar{x} = \dfrac{2240700}{1851}$

$= 1210.53$ [Ans]

(4). Given, $n = 250$

$\bar{x} = 58$

Mean $\bar{x} = \dfrac{\Sigma x_i}{n}$

$\Rightarrow 58 = \dfrac{\Sigma x_i}{250}$

$\therefore \Sigma x_i = 14500$

Now 181 $\rightarrow$ 82

98 $\rightarrow$ 9.

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so, $\Rightarrow (182+98)$

$\Rightarrow 280$

$\&. \quad (82+9)$

$\Rightarrow 91$

Now $.14500-91+280$

$\Rightarrow 14689.$

So Correct mean $\Rightarrow \Rightarrow \frac{14689}{250}$

$\Rightarrow 58.76$ [Ans]

(5) let.

~~Male number~~

Male number = N

∴ Female number = (100 - N)

Now, $(5200 \times N) + (100-N)\,4200 = 5000 \times 100$

$\Rightarrow 5200N - 4200N + 420000 = 500000$

$\Rightarrow 1000N = 500000 - 420000$

$\Rightarrow N = \frac{80000}{1000}$

$= 80$

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So, Male = 80.

So Female = (100-80) = 20.

Male Percentage $= \frac{80}{100} \times 100$

$= 80\%$.

Female percentage $= \frac{20}{100} \times 100$

$= 20\%$.

(6) She will have to run 2km at 15 km/h. and cycle 2km at 30 km/h.

She has to swim 2km at x km/h avg speed 5km/h.

So,

$$\frac{3}{\frac{1}{15}+\frac{1}{30}+\frac{1}{x}} = 5$$

$$\Rightarrow \frac{5}{15}+\frac{5}{30}+\frac{5}{x} = 3$$

$$\Rightarrow \frac{1}{3}+\frac{1}{6}+\frac{5}{x} = 3$$

$$\Rightarrow \frac{5}{x} = 3-\frac{1}{3}-\frac{1}{6}$$

$$\Rightarrow \frac{5}{x} = \frac{18-2-1}{6}$$

$$\Rightarrow \frac{5}{x} = \frac{15}{6}$$

$$\Rightarrow \frac{1}{x} = \frac{1}{2}$$

$\therefore x = 2$.

$\therefore$ She has to swim at 2km/h speed [Ans]

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XI) For first year $\Rightarrow \left(1-\frac{40}{100}\right) = 0.6$

For 2nd year $\Rightarrow \left(1-\frac{20}{100}\right) = 0.8$

For 3rd year $\Rightarrow \left(1-\frac{10}{100}\right) = 0.9$

So Average rate of depreciates $= \cancel{\sqrt[3]{(0.6)}}$

$= \sqrt[3]{(0.6 \times 0.8 \times 0.9)}$

$= 0.725$

Car value $= 3500000 \times 0.6 \times 0.8 \times 0.9$

$= 1512000$ [Ans]

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8.

Mid Value(u)	Frequency f_i	$f_i x_i$	$(x_i - \bar{x})^2$	$f_i(x_i - \bar{x})^2$
13	2	26	3.25	6.5
13.5	16	216	1.70	27.2
14	36	506	0.64	23.04
14.5	60	820	0.09	5.4
15	76	1140	0.03	2.28
15.5	37	573.5	0.48	17.20
16	18	288	0.43	25.74
16.5	3	49.5	2.87	8.61
17	2	34	4.82	9.64
	$n = 250$	$\Sigma f_i x_i =$	15.31	126.17

So Mean $= \frac{\Sigma f_i x_i}{n} = \frac{3701}{n} = 14.804$

variance $\Rightarrow \sum_{i=1}^{k} f_i (u_i - \bar{u})^2 / n-1$

$= \frac{126.17}{250-1}$

$\cancel{20.0} = 0.506$

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∴ Standard derivation, $\sigma = \sqrt{\text{variance}}$

$= \sqrt{0.506}$

$= 0.236$

Here, $\bar{u} = 14.804$, $\sigma = 0.236$

Largest size $= \bar{u} + 3\sigma$

$= 15.51$

Smallest size $= \bar{u} - 3\sigma$

~~= 14.096~~

$= 14.596$

[Ans]

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x_i	f_i	f_ix_i	$f_ix_ix_i$
6.3	1	6.3	39.69
7.2	2	14.4	103.68
7.3	1	7.3	53.29
8.1	2	16.2	131.22
7.8	2	15.6	121.68
6.8	1	6.8	46.24
7.5	3	22.5	168.75
8.2	1	8.2	67.24
8	1	8	64
7.4	4	29.6	219.09
7.6	3	22.8	173.28
7.7	1	7.7	59.29
8.4	1	8.4	70.56
6.2	1	6.2	38.44
Total →	24	180	1356.4.

So $SD = \sqrt{\frac{1}{n}\left(\sum f_i x_i^2 - \frac{f_i^2}{n}\right)}$

$= \frac{1}{24}\left(1356.4 - \left(\frac{180^2}{24}\right)\right)$

$= 6.5164$

So. 0.5 [Ans]

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(1a) Given For A:

$\bar{x}_A = 32.11$

$\sigma_A^2 = 68.09$

$\therefore \sigma_A = \sqrt{68.09}$

$= 8.25$

For B:

$\bar{x}_B = 19.75$

$\sigma_B^2 = 71.14$

$\therefore \sigma_B = \sqrt{71.14}$

$= 8.43$

Now, program A:

$$CV_A = \frac{\sigma_A}{\bar{x}_A} \times 100\%$$

$$= \frac{8.25}{32.11} \times 100 \Rightarrow 25.7\%$$

For B,

$$CV_B = \frac{\sigma_B}{\bar{x}_B} \times 100$$

$$= \frac{8.43}{19.75} \times 100 \Rightarrow 42.68\%$$

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Now,

$CV_B > CV_A$,

So. 'A' program has less relative variability

in performance.