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Subject: Basic Statistics

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MAJOR ASSIGNMENT

Q-1 Take 100 observations randomly & construct the followings:

1. Discrete group frequency distribution table
2. Continuous class boundaries table.

1, 2, 4, 6, 8, 10, ~~12~~, ~~15~~, ~~17~~, 4, 8, 9

10, ~~20~~, ~~25~~, ~~26~~, ~~18~~, 6, 8, ~~23~~

~~21~~, ~~27~~, 9, 10, 9, ~~30~~, ~~21~~

~~24~~, ~~24~~, ~~32~~, ~~35~~, ~~38~~, ~~17~~, ~~18~~, ~~13~~

~~12~~, 10, ~~25~~, ~~31~~, ~~20~~, ~~23~~, 4,

~~35~~, ~~25~~, ~~17~~, ~~18~~, 9, ~~40~~, ~~34~~, ~~27~~

~~28~~, ~~32~~, ~~40~~, ~~36~~, ~~11~~, 2, 8, 7, ~~24~~, ~~26~~

16, ~~36~~, ~~20~~, ~~17~~, ~~23~~, 9, 6, 4, ~~36~~, 9

10, 15, 16, 17, ~~25~~, ~~31~~, ~~20~~, ~~17~~, 9

~~40~~, ~~27~~, 10, 8, 6, 5, 7, 10, ~~50~~

~~48~~, ~~42~~, ~~41~~, ~~40~~, ~~39~~, ~~35~~, ~~31~~

~~24, 14, 20, 18, 49.~~

Discrete Group frequency table:

Class	Tally Marks	Frequency
1 - 10		33
11 - 20		23
21 - 30		23
31 - 40		16
41 - 50		5
		$\Sigma F = 100$ F

Class Boundries

1 - 10	0.5 - 10.5	33
11 - 20	10.5 - 20.5	23
21 - 30	20.5 - 30.5	23
31 - 40	30.5 - 40.5	16
41 - 50	40.5 - 50.5	5
		$\Sigma F = 100$

→ Discrete group frequency table

Application for class boundaries

$$LCB = 1 - \frac{1}{2} = 0.5$$

$$UCB = 5 + \frac{1}{2} = 5.5$$

Q-2 Find the averages of above mentioned frequency distribution table:

• Arithmetic Mean

Class	Frequencies	Mid point	Frequency \times Mid point
1-10	33	5.5	181.5
11-20	23	15.5	356.5
21-30	23	25.5	586.5
31-40	16	35.5	568
41-50	5	45.5	227.5
	$\Sigma F = 100$		$\Sigma fm = 1922$

A.M

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

$$= \frac{1920}{100}$$

$$A.M = 19.2$$

• Geometric Mean

Class	Frequencies	Mid point	F. log(x)
1-10	33	5.5	$33 \times \log(x) = 24.43$
11-20	23	15.5	27.33
21-30	23	25.5	32.35
31-40	16	35.5	24.86
41-5	5	45.5	8.29
	$\sum f = 100$		$\sum f \cdot \log(x)$
			$= 117.24$

G.M

$$G.M = \text{Antilog} \left(\frac{\sum F \times \log x}{\sum F} \right)$$

$$= \text{Anti log} \left(\frac{117.24}{100} \right)$$

$$= \text{Antilog} (1.1724)$$

$$G.M = 14.87$$

HARMONIC MEAN

Class	Frequencies	Midpoint	f/m
1-10	33	5.5	$33/5.5=6$
11-20	23	15.5	1.483
21-30	23	25.5	0.901
31-40	16	35.5	0.450
41-5	5	45.5	0.109
	$\Sigma f = 100$		$\Sigma f/m = 8.943$

H.M

$$M = \frac{\Sigma f}{\Sigma f/m}$$

$$= \frac{100}{8.943}$$

Finding Median & Mode

Class	F.	cf
1-10	33	33
11-20	23	56
21-30	23	79
31-40	16	95
41-50	5	100
	$\Sigma f = 100$	

To find the median we have to make a table of cf.

Formula

$$\text{Median} = \frac{1}{2} (n)$$

$$= \frac{1}{2} (100)$$

$$= \frac{100}{2} = 50$$

↓
median

* So in the table median occurs in the second ~~table~~ interval i.e., of 11-20

Finding Mode:

That class interval consisting of highest frequency value is 33
(The class of 1-10)

Q-3 Find quantiles of the discrete frequency Distribution table:

Q.1, Q.2, Q.3

1: Finding value of Q.1.

Formula,

$$Q_1 = \frac{n+1}{4}$$

$$Q_1 = \frac{(100)+1}{4} = \frac{101}{4} \Rightarrow 25.25 =$$

25

$$Q.2 = \left(\frac{2n+1}{4} \right) = \frac{200+1}{4}$$
$$= \frac{201}{4} = 50$$

$$Q_2 = \boxed{50}$$

Q.3 Formula

$$Q.3 = \frac{3n+1}{4}$$

$$= \frac{3(100) + 1}{4}$$

$$= \frac{301}{4} \Rightarrow 75.25$$

$$Q_3 = 75$$

Q.4

Find the following of the Discrete grouped frequency distribution table.

- Range
- Quartile Range
- Semi Inter Quartile Range
- Variance
- Standard Variance.
- Coefficient of Variation.

→ Finding Range

Class	CB	
1-10	0.5 - 10.5	Range = The lowest.
11-20	10.5 - 20.5	Value - The maximum.
21-30	20.5 - 30.5	Value within the observation.
31-40	30.5 - 40.5	
41-50	40.5 - 50.5	50 - 1 Range = 49

Finding Quartile Range

$$Q. \text{ Range} = Q_3 - Q_1$$

$$= 75 - 26$$

$$Q. R = 50.$$

Finding Semi-Inter. Q Range

Formula,

$$S, I, Q, R = \frac{Q_3 - Q_1}{2}$$

$$= \frac{50}{2} = 25.$$

$$S. I. Q. R = \boxed{25}$$

Calculating Variance

x	F.	Mid Point x	F. \cdot x	mean \bar{x}	$x - \bar{x}$	$(x - \bar{x})^2$
1-10	33	5.5	181.5	19.2	-13.7	187.69
11-20	23	15.5	"	19.2	-13.7	187.69
21-30	23	25.5	"	19.2	6.3	39.69
31-40	16	35.5		19.2	16.3	265.69
41-50	5	45.5	$\Sigma F = 1920$	19.2	26.3	
	$\Sigma F = 100$					$\Sigma F = 1498.45$

$$\text{Variance} = S = \frac{\Sigma F(x - \bar{x})^2}{\Sigma F - 1}$$

$$= \frac{15131.03}{100 - 1} = \frac{15131}{99}$$

$$\text{Variance} = 152.83$$

$$F(x - \bar{x})^2$$

$$6193.77$$

$$314.87$$

$$912.87$$

$$4251.04$$

$$3458.48$$

$$= 15131.03$$

Standard Deviation.

$$\text{Standard Deviation} \\ = \sqrt{\text{Variance}}$$

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

$$S.D = \sqrt{\frac{152.83}{100}} \\ = \sqrt{1.5283}$$

$$S.D = \approx 1.236$$

Co-efficient of Variation

Formula,

$$C.V = \frac{\text{Standard deviation} \times 100}{\bar{x} \text{ (mean)}}$$

$$C.V = \frac{\text{Standard deviation} \times 100}{\bar{x} \text{ (mean)}}$$

$$C.V = \frac{1.236}{19.2} \times 100$$

$$C.V = 6.4375$$