

Assignment

Subject : Basic statistics

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Q.1. Take 100 observations randomly and construct the following.

- (a) Discrete group frequency distribution table
- (b) Continuous class boundaries table.

10, 8, 8, 5, 6, 33, 3, 10, 1, 20, 19, 19, 13, 12, 12,
 12, 11, 17, 19, 30, 22, 22, 23, 27, 29, 30, 25, 25,
 24, 33, 32, 34, 35, 35, 37, 39, 40, 39, 38, 50,
 50, 50, 47, 47, 47, 43, 42, 41, 47, 59, 58, 57, 57,
 57, 53, 52, 52, 52, 60, 70, 69, 68, 65, 62, 65, 65,
 62, 62, 70, 80, 80, 80, 75, 74, 75, 73, 72, 71, 80,
 89, 87, 86, 88, 85, 84, 84, 82, 82, 90, 96,
 95, 96, 100, 96, 98, 99, 98.

① Range = Highest - Lowest .
 = 100 - 1
 = 99.

(2) Class interval keeping at 9.

(2)

Frequency distribution table

| No of Observation (Classes) | Frequency |
|--------------------------------|-----------|
| 1-10 | 10 |
| 11-20 | 10 |
| 21-30 | 10 |
| 31-40 | 10 |
| 41-50 | 10 |
| 51-60 | 10 |
| 61-70 | 10 |
| 71-80 | 10 |
| 81-90 | 10 |
| 91-100 | 10 |

→ Continuous class boundaries table

(3)

| Class | class boundaries | frequency |
|--------|------------------|-----------|
| 0-10 | 0.5 - 10.5 | 10 |
| 11-20 | 10.5 20.5 | 10 |
| 21-30 | 20.5 30.5 | 10 |
| 31-40 | 30.5 40.5 | 10 |
| 41-50 | 40.5 50.5 | 10 |
| 51-60 | 50.5 60.5 | 10 |
| 61-70 | 60.5 70.5 | 10 |
| 71-80 | 70.5 80.5 | 10 |
| 81-90 | 80.5 90.5 | 10 |
| 91-100 | 90.5 100.5 | 10 |

Q2

(8)

Find Average of the above mentioned frequency distribution table.

(1) Arithmetic mean

$$\text{Arithmetic mean} = \frac{\text{Sum of all observation}}{\text{No of observation}}$$

$$= \frac{5190}{100}$$

$$\text{Arithmetic mean} = 51.9$$

Geometric mean:

| Classes | Class-boundaries | Mid value (x_i) | frequency (f_i) | $\log x_i$ | $f_i \times \log(x_i)$ |
|---------|------------------|---------------------|---------------------|------------|------------------------|
| 0-10 | 0.5 - 10.5 | 5 | 10 | 0.6989 | 6.989 |
| 11-20 | 10.5 - 20.5 | 15 | 10 | 1.1761 | 11.761 |
| 21-30 | 20.5 - 30.5 | 25 | 10 | 1.3979 | 13.979 |
| 31-40 | 30.5 - 40.5 | 35 | 10 | 1.544 | 15.44 |
| 41-50 | 40.5 - 50.5 | 45 | 10 | 1.653 | 16.53 |
| 51-60 | 50.5 - 60.5 | 55 | 10 | 1.74 | 17.4 |
| 61-70 | 60.5 - 70.5 | 65 | 10 | 1.813 | 18.13 |
| 71-80 | 70.5 - 80.5 | 75 | 10 | 1.875 | 18.75 |
| 81-90 | 80.5 - 90.5 | 85 | 10 | 1.929 | 19.29 |
| 91-100 | 90.5 - 100.5 | 95 | 10 | 1.9777 | 19.777 |

$$\begin{aligned} \text{Geometric mean} &= \frac{1}{N} \sum_{i=1}^n f_i \log(x_i) \quad (5) \\ &= \frac{158.048}{100} \end{aligned}$$

$$\text{Geometric mean} = 1.58048.$$

$$= \text{mode} = 96.$$

Q3. find Quartiles of discrete frequency Distribution table.

| Classes | frequency | CF |
|---------|-----------|-----|
| 1-10 | 10 | 10 |
| 11-20 | 10 | 20 |
| 21-30 | 10 | 30 |
| 31-40 | 10 | 40 |
| 41-50 | 10 | 50 |
| 51-60 | 10 | 60 |
| 61-70 | 10 | 70 |
| 71-80 | 10 | 80 |
| 81-90 | 10 | 90 |
| 91-100 | 10 | 100 |

Q1 class $\frac{N}{4}$

$$\text{Class} = \frac{100}{4} = 25$$

class (21-30)

The lower boundary of class.

21-30 is 21.

$$x = 21$$

$$Q_1 = \frac{x + \frac{N}{4} - CF}{f} \times C$$

$$Q_1 = 21 + \frac{25 - 30}{10} \times 9$$

$$= 21 + \frac{-5}{10}$$

(7)

$$= 21 + (-0.5 \times 90)$$

$$= 21 + (-4.5)$$

$$Q_1 = 16.5$$

$$Q_2 \text{ (g)} \quad \text{class} = \frac{2^{n^{\text{th}}}}{4}$$

$$= \frac{2(100)}{4} = 50$$

$$\text{class} = 41-50$$

class = 41-50 lower limit is 41

$$Q_2 = L + \frac{\frac{2N}{4} - CF}{f} \times C.$$

$$= 41 + \frac{50 - 50 \times 9}{10}$$

$$= 41 + \frac{0}{10} \times 9$$

$$Q_2 = 41$$

$$Q_3 (3) \quad \text{Class} \quad \frac{3^{th}}{4} \quad (8)$$

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

$$75$$

$$\text{Class} = 71-80$$

Class 71-80 lower limit is 71

$$Q_3 = \frac{L + \frac{3^{\text{th}}}{4} - CF \times C}{f}$$

$$= \frac{71 + \frac{75 - 80}{10} \times 9}{1}$$

$$= 71 + \frac{5}{1} \times 9$$

$$= 71 + (0.5 \times 9)$$

$$71 + (-4.5)$$

$$= 71 - 4.5$$

$$Q_3 = 66.5$$

Q4 find the following Discrete grouped frequency distribution table. ③

(1) Range.

$$\text{Range} = \text{Maximum} - \text{minimum}$$

$$106 - 97$$

$$= 9.$$

Quartile range.

$$Q_3 - Q_1$$

$$\text{interquartile range} = Q_3 - Q_1$$

$$66.5 - 41.$$

$$25.5$$

Semi interquartile Range.

$$= Q_3 - Q_1 / 2.$$

$$= 66.5 - 41 / 2$$

$$= 25.5 / 2.$$

$$\text{Semi quartile range} = 12.75.$$

Variance .

| Classes | Midpoint | Frequency | $(x - \bar{x})$ | $(x - \bar{x})^2$ |
|----------|------------------|-----------|-----------------|-------------------|
| 0 - 10 | 5 | 10 | -45 | 2025 |
| 11 - 20 | 10 15 | 10 | -35 | 1225 |
| 21 - 30 | 15 25 | 10 | -25 | 625 |
| 31 - 40 | 20 35 | 10 | -15 | 225 |
| 41 - 50 | 25 45 | 10 | -5 | 25 |
| 51 - 60 | 55 | 10 | 5 | 25 |
| 61 - 70 | 65 | 10 | 15 | 225 |
| 71 - 80 | 75 | 10 | 25 | 625 25 |
| 81 - 90 | 85 | 10 | 35 | 1225 |
| 91 - 100 | 95 | 10 | 45 | 2025 |

$$\sum x_i = 50$$

$$\sum (x - \bar{x})^2 = 8250$$

$$\text{Variance} = \frac{\sum (x - \bar{x})^2}{100}$$

$$= \frac{8250}{100}$$

$$\text{Variance} = 82.5$$

Standard Deviation

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

$$S.D = \sqrt{82.5}$$

$$S.D = 9.08$$

Co-efficient of variance.

$$\text{Co-efficient of variance} = S.D / \text{mean} \times 100$$

$$= 9.08 / 50 \times 100$$

$$= 18.16\%$$