Measures of Variability of Grouped Data

Ways of Measuring Variability

1. **Range:** the difference between the upper boundary of the highest class and the lower boundary of the lowest class

$$R = UHC - LLC$$

where R = the range
UHC = the upper boundary of the highest class
LLC = the lower boundary of the lowest class

2. **Mean Absolute Deviation (MAD):**

$$MAD = \frac{\sum f|X_m - \overline{x}|}{\sum f}$$

where MAD = the mean absolute deviation
X_m = the class mark
$\overline{x}$ = the mean

3. **Variance:**

$$\sigma^2 = \frac{\sum f(X_m - \mu)^2}{\sum f} \text{ or } s^2 = \frac{\sum f(X_m - \overline{x})^2}{\sum f - 1}$$

where σ^2 = the population variance
s^2 = the sample variance
μ = the population mean

4. **Standard Deviation:**

$$\sigma = \sqrt{\frac{\sum f(X_m - \mu)^2}{\sum f}} \text{ or } s = \sqrt{\frac{\sum f(X_m - \overline{x})^2}{\sum f - 1}}$$

where σ = the population standard deviation
s = the sample standard deviation

Practice Exercises

Calculate the measures of variability for each frequency distribution table.

Mid-year Test Scores of Students in Math

Score	Frequency
41 – 45	1
36 – 40	8
31 – 35	8
26 – 30	14
21 – 25	7
16 – 20	2

Compute the following.
1. Range
2. MAD
3. Variance
4. Standard deviation

Weights of 8–Tesla Students

Weight in kg	Frequency
40 – 44	1
45 – 49	14
50 – 54	15
55 – 59	21
60 – 64	14
65 – 69	10
70 – 74	4
75 – 79	1

Compute the following.
5. Range
6. MAD
7. Variance
8. Standard deviation

Problem Set

Calculate the measures of variability for each frequency distribution table.

Scores of 10–Tesla Students in the 4^{th} Periodic Test in Mathematics

Score	Frequency
46 – 50	2
41 – 45	9
36 – 40	13
31 – 35	11
26 – 30	10
21 – 25	5

Compute the following.
1. Range
2. MAD
3. Variance
4. Standard deviation

Number of Mistakes Made by 50 Students in Factoring Quadratic Equations

Number of Mistakes	Frequency
0 – 2	4
3 – 5	8
6 – 8	15
9 – 11	10
12 – 14	6
15 – 17	5
18 – 20	2

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