

Practice Set 4

Measuring Dispersion of Ungrouped Data

- I. Darin is concerned about Walkman sales variability. First calculate the range for Walkman sales and then the average deviation, the standard deviation, and the variance.

Array of daily Walkman sales: 8, 12, 14, 15, 16, 16, 17, 17, 21, 22, 29

Sample mean: 17

A. Range $H - L = 29 - 8 = 21$

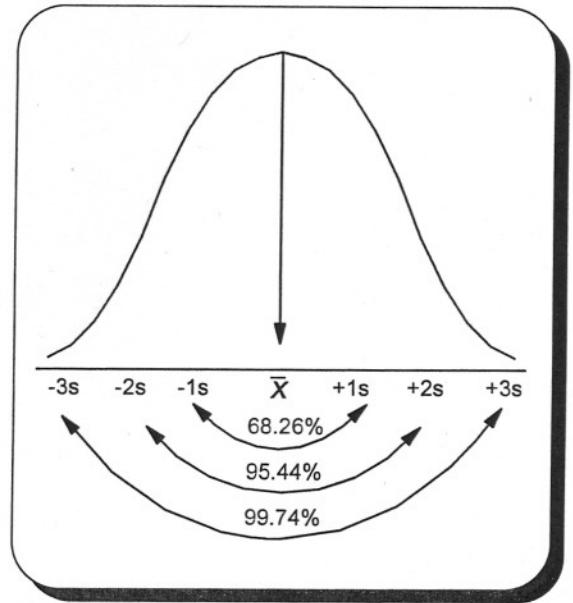
B. Sample average deviation $\frac{\sum |x - \bar{x}|}{n} = \frac{42}{11} = 3.8$

C. Sample variance

$$s^2 = \frac{\sum (x - \bar{x})^2}{n - 1} = \frac{306}{10} = 30.6$$

D. Sample standard deviation

$$s = \sqrt{s^2} = \sqrt{30.6} = 5.53 \rightarrow 5.5$$



- II. Label this graph depicting the empirical rule.

- III. Last year's mean weekly Walkman sales were 16 and the standard deviation was 4. Use the empirical rule to determine a range for Walkman sales for one, two, and three sample standard deviations from the mean.

A. One Standard Deviation

$$16 \pm 1(4)$$

$$16 \pm 4$$

68.26% range: 12 ↔ 20

B. Two Standard Deviations

$$16 \pm 2(4)$$

$$16 \pm 8$$

95.44% range: 8 ↔ 24

C. Three Standard Deviations

$$16 \pm 3(4)$$

$$16 \pm 12$$

99.74% range: 4 ↔ 28

- IV. Use Chebyshev's rule to determine a range for Walkman sales being within two sample standard deviations of the mean (see question III).

$$1 - \frac{1}{k^2}$$

$$= 1 - \frac{1}{2^2} = 1 - \frac{1}{4} = \frac{3}{4} \rightarrow 75\%$$

- V. Darin read in a trade publication that the average Walkman sales and standard deviation for a store his size and type are 18 and 3 respectively. Using the sample data from page 18, are Darin's Walkman sales more or less variable than those of his industry? Use the standard deviation calculated in question 1.

Industry Sales Data

$$C.V. = \frac{\sigma}{\mu}(100) = \frac{3}{18}(100) = 16.67\%$$

Darin's Music Emporium

$$C.V. = \frac{s}{\bar{x}}(100) = \frac{5.5}{17}(100) = 32.35\%$$

Sales from this small sample of only 11 days were twice as variable as industry population data.