

## Quick Questions 4 Measuring Dispersion of Ungrouped Data

I. Place the number of the appropriate formula next to the parameter or statistic it describes.

- A. Population average deviation 1
- B. Population variance 2
- C. Population standard deviation 3
- D. Alternative population variance 4
- E. Alternative population standard deviation 5
- F. Chebyshev's rule 6
- G. Sample variance 7
- H. Sample standard deviation 8
- I. Alternative sample variance 9
- J. Alternative sample standard deviation 10

Note how the answers are in sequence. This was done to allow students to compare population formulas on the left with the corresponding sample formula on the right.

II. Calculate the following statistics using this sample data.

Data: 5, 7, 3, 8, 6, 10, 9, 8

$\bar{x} = 7$

A. Variance (use alternative formula)

$$s^2 = \frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1} = \frac{428 - \frac{(56)^2}{8}}{8-1} = \frac{428 - 392}{8-1} = 5.1$$

B. Standard deviation

$$s = \sqrt{s^2} = \sqrt{5.1} = 2.3$$

C. Average deviation

$$\text{A.D.} = \frac{\sum |x - \bar{x}|}{n} = \frac{14}{8} = 1.8$$

III. Use Chebyshev's rule to calculate the percentage of question II outcomes that will be within 3 standard deviations of the mean. Was this prediction correct?

$$1 - \frac{1}{k^2} = 1 - \frac{1}{3^2} = 1 - \frac{1}{9} = \frac{8}{9} \rightarrow 88.9\%$$

$$7 \pm 3(2.3)$$

$$7 \pm 6.9$$

$$.1 \leftrightarrow 13.9$$

A. Chebyshev predicts a minimum of 88.9% will be between .1 and 13.9.

B. Array of daily Walkman sales: 3, 5, 6, 7, 8, 8, 9, 10

C. All are between .1 and 13.9.

IV. A data set of grades is normally distributed and has a mean of 84 and a standard deviation of 4. Calculate a range of grades that will include the middle 95.44% of the data set.

The empirical rule states that 95.44% of normally distributed data will be within 2 standard deviations.

$$84 \pm 2(4)$$

$$84 \pm 8$$

$$76 \leftrightarrow 92$$