VITAL MATHEMATICS

STATISTICS

Range Rule of Thumb for Identifying Significant Values

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INTRODUCTION

The range rule for thumb for identifying significant values is used to identify all values that are considered to be too low or high for the data set using the mean and standard deviation. The low data values are known as the significantly low values; the high data values are known as the significantly high values.

RANGE RULE OF THUMB FOR IDENTIFYING SIGNIFICANT VALUES EQUATION

Significantly Low: $\mu - 2\sigma \; or \; lower$

Significantly High: $\mu + 2\sigma \; or \; higher$

Values that are between the significantly low and significantly high are not significant.

SOLVING EMPIRICAL RULE FOR DATA WITH A BELL – SHAPED DISTRIBUTION

Significantly Low: $\mu - 2\sigma \; or \; lower$

Significantly High: $\mu + 2\sigma \; or \; higher$

STEP 1) Calculate the population mean if it is not given.

$$\mu = \frac{\Sigma x}{N}$$

STEP 2) Calculate the sample standard deviation if it is not given.

$$s = \sqrt{\frac{\Sigma(x - \bar{x})^2}{n - 1}}$$

STEP 3) Identify which percentage to calculate

STEP 4) Provide conclusion

EMPIRICAL RULE FOR DATA WITH A BELL – SHAPED DISTRIBUTION EXAMPLE

Example 1) What percentage of values are between 1 and 33, when the mean is 17 and standard deviation is 8?

Example 2) Find which values compose 68%, 95% and 99.7% of data, when $\bar{x} = 47 \; and \; s = 3$?

Concepts Concerning the EMPIRICAL RULE FOR DATA WITH A BELL – SHAPED DISTRIBUTION

When the data is not bell-shaped, this rule will not accurately report the data. For data that is not bell-shaped, use the Chebyshev's theorem in order to find what percentage of numbers are within a number of standard deviations from the mean. The Chebyshev's theorem has one restriction, $k \neq 1$; or standard deviation cannot be 1.

$$Chebyshev's\ Theorem: 1 - \frac{1}{k^2}; k \neq 1$$

K is any positive number

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