Important Measures of Dispersion Formulas PDF

Formulas

Examples

with Units

List of 14
Important Measures of Dispersion Formulas

1) Quartile Deviation Formulas

1.1) Quartile Deviation Formula

Formula

$$QD = \frac{Q_3 - Q_1}{2}$$

Example

$$30 = \frac{80 - 20}{2}$$

1.2) Quartile Deviation given Coefficient of Quartile Deviation Formula

Formula

$$QD = CQ \cdot \left(\frac{Q_3 + Q_1}{2} \right)$$

Example

$$30 = 0.6 \cdot \left(\frac{80 + 20}{2} \right)$$

2) Standard Deviation Formulas

2.1) Pooled Standard Deviation Formula

Formula

$$\sigma_{Pooled} = \sqrt{\frac{\left(\left(N_X - 1 \right) \cdot \left(\sigma_X^2 \right) \right) + \left(\left(N_Y - 1 \right) \cdot \left(\sigma_Y^2 \right) \right)}{N_X + N_Y - 2}}$$

Example

$$35.0083 = \sqrt{\frac{\left(\left(8 - 1 \right) \cdot \left(29^2 \right) \right) + \left(\left(6 - 1 \right) \cdot \left(42^2 \right) \right)}{8 + 6 - 2}}$$

2.2) Standard Deviation given Coefficient of Variation Formula

Formula

$$\sigma = \mu \cdot CV_{Ratio}$$

Example

$$2.505 = 1.5 \cdot 1.67$$

2.3) Standard Deviation given Coefficient of Variation Percentage Formula 📲

Formula

$$\sigma = \frac{\mu \cdot CV_{\%}}{100}$$

Example

$$2.505 = \frac{1.5 \cdot 167}{100}$$

2.4) Standard Deviation given Mean Formula 📲

Formula

$$\sigma = \sqrt{\left(\frac{\Sigma x^2}{N}\right) - \left(\mu^2\right)}$$

Example

$$2.5 = \sqrt{\left(\frac{85}{10}\right) - \left(1.5^2\right)}$$

2.5) Standard Deviation given Variance Formula 📲

Formula

$$\sigma = \sqrt{\sigma^2}$$

Example

$$2.5 = \sqrt{6.25}$$

2.6) Standard Deviation of Data Formula 📲

Formula

$$\sigma = \sqrt{\left(\frac{\Sigma x^2}{N}\right) - \left(\left(\frac{\Sigma x}{N}\right)^2\right)}$$

Example

$$2.5 = \sqrt{\left(\frac{85}{10}\right) - \left(\left(\frac{15}{10}\right)^2\right)}$$

2.7) Standard Deviation of Sum of Independent Random Variables Formula 📲

Formula

$$\sigma_{(X+Y)} = \sqrt{\left(\sigma_{X(Random)}^2\right) + \left(\sigma_{Y(Random)}^2\right)}$$

Example

$$5 = \sqrt{\left(3^2\right) + \left(4^2\right)}$$

3) Variance Formulas 📲

3.1) Pooled Variance Formula 📲

Formula

$$V_{Pooled} = \frac{\left(\left(N_X - 1\right) \cdot \sigma^2 X\right) + \left(\left(N_Y - 1\right) \cdot \sigma^2 Y\right)}{N_X + N_Y - 2}$$

Example

$$1225.4167 = \frac{\left(\left(8 - 1\right) \cdot 840\right) + \left(\left(6 - 1\right) \cdot 1765\right)}{8 + 6 - 2}$$

3.2) Variance given Standard Deviation Formula ↗

Formula

$$\sigma^2 = (\sigma)^2$$

Example

$$6.25 = (2.5)^2$$

3.3) Variance of Data Formula ↗

Formula

$$\sigma^2 = \left(\frac{\Sigma x^2}{N} \right) - \left(\mu^2 \right)$$

Example

$$6.25 = \left(\frac{85}{10} \right) - \left(1.5^2 \right)$$

3.4) Variance of Scalar Multiple of Random Variable Formula ↗

Formula

$$V_{cX} = \left(c^2 \right) \cdot \sigma^2 Random\ X$$

Example

$$36 = \left(2^2 \right) \cdot 9$$

3.5) Variance of Sum of Independent Random Variables Formula ↗

Formula

$$\sigma^2 Sum = \sigma^2 Random\ X + \sigma^2 Random\ Y$$

Example

$$25 = 9 + 16$$

Variables used in list of Measures of Dispersion Formulas above

- **c** Scalar Value c
- **CQ** Coefficient of Quartile Deviation
- **CV$_\%$** Coefficient of Variation Percentage
- **CV$_{Ratio}$** Coefficient of Variation Ratio
- **N** Number of Individual Values
- **N$_X$** Size of Sample X
- **N$_Y$** Size of Sample Y
- **Q$_1$** First Quartile of Data
- **Q$_3$** Third Quartile of Data
- **QD** Quartile Deviation of Data
- **V$_{cX}$** Variance of Scalar Multiple of Random Variable
- **V$_{Pooled}$** Pooled Variance
- **μ** Mean of Data
- **σ** Standard Deviation of Data
- **σ$_{(X+Y)}$** Standard Deviation of Sum of Random Variables
- **σ$_{Pooled}$** Pooled Standard Deviation
- **σ$_X$** Standard Deviation of Sample X
- **σ$_{X(Random)}$** Standard Deviation of Random Variable X
- **σ$_Y$** Standard Deviation of Sample Y
- **σ$_{Y(Random)}$** Standard Deviation of Random Variable Y
- **σ^2** Variance of Data
- **σ^{2}Random X** Variance of Random Variable X
- **σ^{2}Random Y** Variance of Random Variable Y
- **σ^{2}Sum** Variance of Sum of Independent Random Variables
- **σ^{2}X** Variance of Sample X
- **σ^{2}Y** Variance of Sample Y
- **Σx** Sum of Individual Values
- **Σx^2** Sum of Squares of Individual Values

Constants, Functions, Measurements used in list of Measures of Dispersion Formulas above

- Functions: **sqrt**, sqrt(Number)
  A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.

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