

Important Basic Formulas in Statistics PDF



Formulas Examples with Units

List of 18 Important Basic Formulas in Statistics

1) Chi Square Statistic Formula ↻

Formula

$$\chi^2 = \frac{(N - 1) \cdot s^2}{\sigma^2}$$

Example

$$25 = \frac{(10 - 1) \cdot 15^2}{9^2}$$

Evaluate Formula ↻

2) Chi Square Statistic given Sample and Population Variances Formula ↻

Formula

$$\chi^2 = \frac{(N - 1) \cdot s^2}{\sigma^2}$$

Example

$$25 = \frac{(10 - 1) \cdot 225}{81}$$

Evaluate Formula ↻

3) Class Width of Data Formula ↻

Formula

$$w_{\text{Class}} = \frac{\text{Max} - \text{Min}}{N_{\text{Class}}}$$

Example

$$4 = \frac{85 - 5}{20}$$

Evaluate Formula ↻

4) Expectation of Difference of Random Variables Formula ↻

Formula

$$E_{(X-Y)} = E_{(X)} - E_{(Y)}$$

Example

$$2 = 36 - 34$$

Evaluate Formula ↻

5) Expectation of Sum of Random Variables Formula ↻

Formula

$$E_{(X+Y)} = E_{(X)} + E_{(Y)}$$

Example

$$70 = 36 + 34$$

Evaluate Formula ↻

6) F Value of Two Samples Formula ↻

Formula

$$F = \frac{\sigma^2 X}{\sigma^2 Y}$$

Example

$$2.25 = \frac{576}{256}$$

Evaluate Formula ↻



7) F Value of Two Samples given Sample Standard Deviations Formula

Formula

$$F = \left(\frac{\sigma_X}{\sigma_Y} \right)^2$$

Example

$$2.25 = \left(\frac{24}{16} \right)^2$$

Evaluate Formula 

8) Largest Item in Data given Range Formula

Formula

$$\text{Max} = R + \text{Min}$$

Example

$$85 = 80 + 5$$

Evaluate Formula 

9) Mid Range of Data Formula

Formula

$$R_{\text{Mid}} = \frac{X_{\text{Max}} + X_{\text{Min}}}{2}$$

Example

$$28 = \frac{50 + 6}{2}$$

Evaluate Formula 

10) Number of Classes given Class Width Formula

Formula

$$N_{\text{Class}} = \frac{\text{Max} - \text{Min}}{w_{\text{Class}}}$$

Example

$$20 = \frac{85 - 5}{4}$$

Evaluate Formula 

11) Number of Individual Values given Residual Standard Error Formula

Formula

$$n = \left(\frac{\text{RSS}}{\text{RSE}^2} \right) + 1$$

Example

$$29.8889 = \left(\frac{260}{3^2} \right) + 1$$

Evaluate Formula 

12) P Value of Sample Formula

Formula

$$P = \frac{P_{\text{Sample}} - P_0(\text{Population})}{\sqrt{\frac{P_0(\text{Population}) \cdot (1 - P_0(\text{Population}))}{N}}}$$

Example

$$0.6455 = \frac{0.7 - 0.6}{\sqrt{\frac{0.6 \cdot (1 - 0.6)}{10}}}$$

Evaluate Formula 

13) Range of Data Formula

Formula

$$R = \text{Max} - \text{Min}$$

Example

$$80 = 85 - 5$$

Evaluate Formula 



14) Relative Frequency Formula ↻

Formula

$$f_{\text{Rel}} = \frac{f_{\text{Abs}}}{f_{\text{Total}}}$$

Example

$$0.2 = \frac{10}{50}$$

Evaluate Formula ↻

15) Sample Size given P Value Formula ↻

Formula

$$N = \frac{(P^2) \cdot P_{0(\text{Population})} \cdot (1 - P_{0(\text{Population})})}{(P_{\text{Sample}} - P_{0(\text{Population})})^2}$$

Example

$$10.14 = \frac{(0.65^2) \cdot 0.6 \cdot (1 - 0.6)}{(0.7 - 0.6)^2}$$

Evaluate Formula ↻

16) Smallest Item in Data given Range Formula ↻

Formula

$$\text{Min} = \text{Max} - R$$

Example

$$5 = 85 - 80$$

Evaluate Formula ↻

17) t Statistic Formula ↻

Formula

$$t = \frac{\mu_{\text{Observed}} - \mu_{\text{Theoretical}}}{\frac{s}{\sqrt{N}}}$$

Example

$$4.638 = \frac{64 - 42}{\frac{15}{\sqrt{10}}}$$

Evaluate Formula ↻

18) t Statistic of Normal Distribution Formula ↻

Formula

$$t_{\text{Normal}} = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{N}}}$$

Example

$$4.2164 = \frac{48 - 28}{\frac{15}{\sqrt{10}}}$$

Evaluate Formula ↻



Variables used in list of Basic Formulas in Statistics above

- $E_{(X)}$ Expectation of Random Variable X
- $E_{(X+Y)}$ Expectation of Sum of Random Variables
- $E_{(X-Y)}$ Expectation of Difference of Random Variables
- $E_{(Y)}$ Expectation of Random Variable Y
- **F** F Value of Two Samples
- f_{Abs} Absolute Frequency
- f_{Rel} Relative Frequency
- f_{Total} Total Frequency
- **Max** Largest Item in Data
- **Min** Smallest Item in Data
- **n** Number of Individual Values
- **N** Sample Size
- N_{Class} Number of Classes
- **P** P Value of Sample
- $P_{0(\text{Population})}$ Assumed Population Proportion
- P_{Sample} Sample Proportion
- **R** Range of Data
- R_{Mid} Mid Range of Data
- **RSE** Residual Standard Error of Data
- **RSS** Residual Sum of Squares
- **s** Sample Standard Deviation
- s^2 Sample Variance
- **t** t Statistic
- t_{Normal} t Statistic of Normal Distribution
- w_{Class} Class Width of Data
- $\bar{x}$ Sample Mean
- X_{Max} Maximum Value of Data
- X_{Min} Minimum Value of Data
- μ Population Mean
- μ_{Observed} Observed Mean of Sample
- $\mu_{\text{Theoretical}}$ Theoretical Mean of Sample
- σ Population Standard Deviation

Constants, Functions, Measurements used in list of Basic Formulas in Statistics above

- **Functions:** **sqrt**, $\text{sqrt}(\text{Number})$
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.



- σ_X Standard Deviation of Sample X
- σ_Y Standard Deviation of Sample Y
- σ^2 Population Variance
- σ^2_X Variance of Sample X
- σ^2_Y Variance of Sample Y
- χ^2 Chi Square Statistic



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