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Basic Formulas in Statistics

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List of 18 Basic Formulas in Statistics

Basic Formulas in Statistics

1) Chi Square Statistic

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

Open Calculator 

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

2) Chi Square Statistic given Sample and Population Variances

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

Open Calculator 

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

3) Class Width of Data

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

Open Calculator 

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



4) Expectation of Difference of Random Variables

$$fx \quad E_{(X-Y)} = E_{(X)} - E_{(Y)}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$ex \quad 2 = 36 - 34$$

5) Expectation of Sum of Random Variables

$$fx \quad E_{(X+Y)} = E_{(X)} + E_{(Y)}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$ex \quad 70 = 36 + 34$$

6) F Value of Two Samples

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

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

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

7) F Value of Two Samples given Sample Standard Deviations

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

[Open Calculator !\[\]\(b64b40baaee5acddc1eab8538ba84754_img.jpg\)](#)

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



8) Largest Item in Data given Range 

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

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)

$$ex \quad 85 = 80 + 5$$

9) Mid Range of Data 

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

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)


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

10) Number of Classes given Class Width 

$$fx \quad N_{\text{Class}} = \frac{\text{Max} - \text{Min}}{W_{\text{Class}}}$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7_img.jpg\)](#)

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

11) Number of Individual Values given Residual Standard Error 

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

[Open Calculator !\[\]\(899d8b7697d64725bf017d3296cfcf1b_img.jpg\)](#)

$$ex \quad 29.88889 = \left(\frac{260}{(3)^2} \right) + 1$$




12) P Value of Sample 

$$fx \quad P = \frac{P_{\text{Sample}} - P_{0(\text{Population})}}{\sqrt{\frac{P_{0(\text{Population})} \cdot (1 - P_{0(\text{Population})})}{N}}}$$

Open Calculator 

$$ex \quad 0.645497 = \frac{0.7 - 0.6}{\sqrt{\frac{0.6 \cdot (1 - 0.6)}{10}}}$$

13) Range of Data 

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

Open Calculator 


$$ex \quad 80 = 85 - 5$$

14) Relative Frequency 

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

Open Calculator 

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

15) Sample Size given P Value 

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

Open Calculator 

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



16) Smallest Item in Data given Range

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

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0_img.jpg\)](#)

$$ex \quad 5 = 85 - 80$$

17) t Statistic

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

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5_img.jpg\)](#)

$$ex \quad 4.638007 = \frac{64 - 42}{\frac{15}{\sqrt{10}}}$$

18) t Statistic of Normal Distribution

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

[Open Calculator !\[\]\(ab4e2b3fc7e7887b7a72f548aa6f5e60_img.jpg\)](#)

$$ex \quad 4.21637 = \frac{48 - 28}{\frac{15}{\sqrt{10}}}$$



Variables Used

- $E(X)$ 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(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
- **s²** 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
- 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



Constants, Functions, Measurements used

- **Function:** `sqrt`, `sqrt(Number)`
Square root function



Check other formula lists

- [Basic Formulas in Statistics](#) 
- [Coefficients, Proportion and Regression Formulas](#) 
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