Additional Rule	$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
Binomial Coefficient	$\binom{n}{x} = \frac{n!}{(n-x)!x!}$
Binomial Probability	$P(x) = C_{n,x} p^x q^{n-x} = \frac{n!}{(n-x)!x!} p^x q^{n-x}$
Central Limit Theorem	$\mu_{\bar{x}} = \mu$
Central Limit Theorem (Standard Error)	$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$
Chebyshev's Theorem: At least	$1 - \frac{1}{k^2}$
Combination	$C(n,r) = \frac{n!}{(n-r)!r!}$
Complement Rule	$P(\text{not } A) = P(\bar{A}) = 1 - P(A)$
Confidence Interval for estimate for proportional, *p*	$\hat{p} \pm Z_{\alpha/2} \cdot \sqrt{\frac{\hat{p}\hat{q}}{n}} \quad \hat{p} = \frac{x}{n}$
Confidence Interval for mean, μ (σ known)	$\bar{X} \pm Z_{\alpha/2} \cdot \left(\frac{\sigma}{\sqrt{n}}\right)$ $\bar{x} - E < \mu < \bar{x} + E \quad \text{where } E = Z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$
Confidence Interval for mean, μ (σ unknown)	$\bar{X} \pm t\left(df, \frac{\alpha}{2}\right) \cdot \left(\frac{s}{\sqrt{n}}\right) \quad \text{with } df = n-1$ $\bar{x} - E < \mu < \bar{x} + E \quad \text{where } E = t_{\alpha/2} \cdot \frac{s}{\sqrt{n}}$
Correlation	$r = \frac{n\sum xy - \left(\sum x\right)\left(\sum y\right)}{\sqrt{n\left(\sum x^2\right) - \left(\sum x\right)^2}\sqrt{n\left(\sum y^2\right) - \left(\sum y\right)^2}}$ $r = \frac{\sum\left(z_x z_y\right)}{n-1}$
Covariance of *x* and *y*	$covar(x, y) = \sum \frac{(x-\bar{x})(y-\bar{y})}{n-1}$
Degrees of freedom for error	$df\ (error) = n - c$
Degrees of freedom for factor	$df\ (factor) = c - 1$
Degrees of freedom for total	$df\ (total) = n - 1$

Depth of sample median	$d(\tilde{x})=\frac{n+1}{2}$
Empirical Probability	$P'(A)=\frac{n(A)}{n}$
Equation for line of best fit	$\hat{y}=b_0+b_1x$
Estimated for variance of slope	$s_{b_1}^2=\frac{s_t^2}{SS(x)}=\frac{s_t^2}{\sum x^2-\frac{\left(\sum x\right)^2}{n}}$
Estimated variance of error	$s_t^2=\sum\frac{(y-\hat{y})^2}{n-2}$ $s_t^2=\frac{\sum y^2-b_0\sum y-b_1\sum xy}{n-2}$
Experimental error	$e=y-\hat{y}$
Factorial	$n!=n(n-1)(n-2)\cdots 3\cdot 2\cdot 1$
Mann-Whitney U test	$U_a=n_a\cdot n_b+\frac{1}{2}n_b\cdot(n_b+1)-R_b$ $U_b=n_a\cdot n_b+\frac{1}{2}n_a\cdot(n_a+1)-R_a$
Margin Error	$E=Z_{\alpha/2}\sqrt{\frac{\hat{p}\hat{q}}{v}}$
Mathematical model	$x_{c,k}=\mu+F_c+\varepsilon_{k(c)}$
Mean	$\bar{x}=\frac{\sum x}{n}$
Mean (binomial)	$\mu=n\cdot p$
Mean (*frequency table*)	$\bar{x}=\frac{\sum f\cdot x}{\sum f}$
Mean of Discrete random variable	$\mu=\sum\left[x\cdot P(x)\right]$
Mean square for error	$MS(error)=\frac{SS(error)}{df\,(error)}$
Mean square for factor	$MS(factor)=\frac{SS(factor)}{df\,(factor)}$
Multiplication Rule	$P(A\ and\ B)=P(A)\cdot P(B\vert A)$
Mutually exclusive	$P(A\ or\ B)=P(A)+P(B)$

Paired differences	$d = x_1 - x_2$
Pearson's Correlation Coefficient	$r = \dfrac{SS(xy)}{\sqrt{SS(x) \cdot SS(y)}} = \dfrac{covar(x,y)}{S_x \cdot S_y}$
Permutation	$P(n,r) = \dfrac{n!}{(n-r)!}$
Probability	$P(A) = \dfrac{n(A)}{n(S)}$
Range	$H - L$
Sample mean of paired differences	$\bar{d} = \dfrac{\sum d}{n}$
Sample size for 1 – α confidence estimate for μ	$n = \left[Z_{\alpha/2} \cdot \dfrac{\sigma}{E} \right]^2 = \left[Z_{\alpha/2} \cdot \dfrac{\sigma}{\mu} \right]^2$
Sample standard deviation of paired differences	$s_d = \sqrt{\dfrac{\sum d^2 - \dfrac{\left(\sum d\right)^2}{n}}{n-1}}$
Slope for line of best fit	$b_1 = \dfrac{SS(xy)}{SS(x)}$ $b_1 = \dfrac{n\sum xy - \left(\sum x\right)\left(\sum y\right)}{n\left(\sum x^2\right) - \left(\sum x\right)^2}$
Spearman's rank correlation coefficient	$r_s = 1 - \dfrac{6\sum x^2}{n\left(n^2 - 1\right)}$
Standard deviation	$s = \sqrt{\dfrac{\sum (x - \bar{x})^2}{n-1}}$
Standard deviation about line best fit	$s_t = \sqrt{s_t^2}$
Standard deviation (binomial)	$\sigma = \sqrt{n \cdot p \cdot q}$
Standard deviation (*frequency table*)	$s = \sqrt{\dfrac{n\left[\sum\left(f \cdot x^2\right)\right] - \left[\sum(f \cdot x)\right]^2}{n(n-1)}}$
Standard deviation (prob. Dist)	$\sigma = \sqrt{\sum\left[x^2 \cdot P(x)\right] - \mu^2}$
Standard Score	$z = \dfrac{x - \bar{x}}{s} \quad or \quad \dfrac{x - \mu}{\sigma}$

Sum of squares due to factor	$SS(error) = \left[\frac{C_1^2}{k_1} + \frac{C_2^2}{k_2} + \frac{C_3^2}{k_3} + \cdots \right] - \frac{\left(\sum x\right)^2}{n}$
Sum of squares of *x*	$SS(x) = \sum x^2 - \frac{\left(\sum x\right)^2}{n}$
Sum of squares of *xy*	$SS(xy) = \sum xy - \frac{\sum x \cdot \sum y}{n}$
Total variation	$\sum (y - \bar{y})^2$
Variance (***shortcut***)	$s^2 = \frac{\sum x^2 - \frac{\left(\sum x\right)^2}{n}}{n-1}$
Variance (binomial)	$\sigma^2 = n \cdot p \cdot q$
Variance for a probability distribution (easier computations)	$\sigma^2 = \sum \left[x^2 \cdot P(x) \right] - \mu^2$
Variance for a probability distribution (easier to understand)	$\sigma^2 = \sum \left[(x-\mu)^2 \cdot P(x) \right]$
Variance of discrete random variable	$\sigma^2 = \sum \left[x^2 P(x) \right] - \left(\sum \left[xP(x) \right] \right)^2$
y-intercept for line of best fit	$b_0 = \frac{\sum y - b_1 \cdot \sum x}{n}$