



Intro to Statistics Formula Sheet



A) Reminder:

BEDM(S)AS – Brackets, Exponents, Division, Multiplication, Sum (Σ), Addition, Subtraction

B) Central Tendency (Ch. 3)

Population mean: $\mu = \frac{\Sigma X}{N}$ Sample mean: $M = \frac{\Sigma X}{n}$

C) Sum of Squares (Ch. 4, p. 70-71)

Definitional Formula: $SS = \Sigma(X - \mu)^2$

Computational Formula: $SS = \Sigma X^2 - \frac{(\Sigma X)^2}{N}$

D) Variance (Ch. 4)

Population
 Definitional Formula: $\sigma^2 = \frac{\Sigma(X - \bar{X})^2}{N}$
 Computational Formula: $\sigma^2 = \frac{\Sigma X^2 - \frac{(\Sigma X)^2}{N}}{N}$
 Basic Formula: $\sigma^2 = \frac{SS}{N}$

Sample
 Definitional Formula: $s^2 = \frac{\Sigma(X - \bar{X})^2}{n-1}$
 Computational Formula: $s^2 = \frac{\Sigma X^2 - \frac{(\Sigma X)^2}{n}}{n-1}$
 Basic Formula: $s^2 = \frac{SS}{n-1}$

E) Standard Deviation (Ch. 4)

Population
 Computational Formula: $\sigma = \sqrt{\frac{\Sigma X^2 - \frac{(\Sigma X)^2}{N}}{N}}$
 Basic Formula: $\sigma = \sqrt{\frac{SS}{N}}$
 Sample
 Computational Formula: $s = \sqrt{\frac{\Sigma X^2 - \frac{(\Sigma X)^2}{n}}{n-1}}$
 Basic Formula: $s = \sqrt{\frac{SS}{n-1}}$

F) z-Score (Ch. 5)

For locating an X value's position within a sample:

$$z = \frac{X - \mu}{\sigma} \quad X = z\sigma + \mu \quad \sigma = \frac{X - \mu}{z}$$

For locating a sample mean's position within a population:

$$z = \frac{M - \mu}{\sigma_M} \quad M = z\sigma_M + \mu \quad \sigma_M = \frac{\sigma}{\sqrt{n}} \quad \text{OR} \quad \sigma_M = \sqrt{\frac{\sigma^2}{n}}$$

Finding Degrees of Freedom

z-Scores	
Single Sample t-Statistic	$df = n - 1$
Paired / Related Sample t-Statistic	
Independent Samples t-Statistic	$df = (n_1 - 1) + (n_2 - 1)$
Paired Samples t-Statistics	
Independent Measures ANOVA:	$df = (df_{\text{between}}), (df_{\text{within}})$ $df_{\text{between}} = k - 1$ $df_{\text{within}} = N - k$
Repeated Measures ANOVA:	$df = (df_{\text{between}}), (df_{\text{error}})$ $df_{\text{between}} = k - 1$ $df_{\text{error}} = (N - K) - (n - 1)$
Chi-Square:	If single row of data: $df = C - 1$ If table of data: $df = (R - 1)(C - 1)$



Intro to Statistics Formula Sheet



G) Single Sample t-Statistic (Ch. 7)

$$t = \frac{M - \mu}{s_M} \quad s_M = \frac{s}{\sqrt{n}} \quad \text{OR} \quad s_M = \sqrt{\frac{s^2}{n}}$$

H) Independent Measures & Two Samples t-Statistic (Ch. 8)

$$t = \frac{(M_1 - M_2) - (\mu_1 - \mu_2)}{s_{M_1 - M_2}}$$

$$\text{If sample sizes are the same: } s_{M_1 - M_2} = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

$$\text{If the sample sizes are different: } s_{M_1 - M_2} = \sqrt{\frac{s_p^2}{n_1} + \frac{s_p^2}{n_2}}$$

$$\text{Pooled Variance: } s_p^2 = \frac{SS_1 + SS_2}{df_1 + df_2}$$

I) Paired Samples & Related Samples t-Statistic (Ch. 9)

$$t = \frac{M_D - \mu_D}{s_{M_D}} \quad s_{M_D} = \frac{s_D}{\sqrt{n}}$$

J) Independent Measures & Repeated Measures ANOVA (Ch. 10)

$$SS_{\text{total}} = \sum X^2 - \frac{G^2}{N}$$

$$SS_{\text{between}} = \sum \frac{T^2}{n} - \frac{G^2}{N}$$

$$SS_{\text{within}} = \sum SS_{\text{within (each condition)}}$$

$$MS_{\text{between}} = \frac{SS_{\text{between}}}{df_{\text{between}}}$$

$$MS_{\text{within}} = \frac{SS_{\text{within}}}{df_{\text{within}}}$$

$$df_{\text{total}} = N - 1$$

$$df_{\text{between}} = k - 1$$

$$df_{\text{within}} = N - k$$

$$F = \frac{MS_{\text{between}}}{MS_{\text{within}}}$$

K) Pearson Correlation (Ch. 11)

$$r = \frac{SP}{\sqrt{(SS_x)(SS_y)}}$$

$$SP = \sum XY - \frac{(\sum X)(\sum Y)}{n}$$

$$SS_x = \sum X^2 - \frac{(\sum X)^2}{n}$$

$$SS_y = \sum Y^2 - \frac{(\sum Y)^2}{n}$$

L) Chi-Square Statistic (Ch. 12)

$$\chi^2 = \sum \frac{(f_o - f_e)^2}{f_e}$$

