Intro to Statistics Formula Sheet

A) Reminder:

BEDM(S)AS – Brackets, Exponents, Division, Multiplication, Sum ($\sum$), Addition, Subtraction

B) Central Tendency (Ch. 3)

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

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

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

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

D) Variance (Ch. 4)

Population

Definitional Formula: $\sigma^2 = \frac{\sum(X-\bar{X})^2}{N}$

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

Basic Formula: $\sigma^2 = \frac{SS}{N}$

Sample

Definitional Formula: $s^2 = \frac{\sum(X-\bar{X})^2}{n-1}$

Computational Formula: $s^2 = \frac{\sum X^2 - \frac{(\sum X)^2}{n}}{n-1}$

Basic Formula: $s^2 = \frac{SS}{n-1}$

E) Standard Deviation (Ch. 4)

Population

Computational Formula: $\sigma = \sqrt{\frac{\sum X^2 - \frac{(\sum X)^2}{N}}{N}}$

Basic Formula: $\sigma = \sqrt{\frac{SS}{N}}$

Sample

Computational Formula: $s = \sqrt{\frac{\sum X^2 - \frac{(\sum X)^2}{n}}{n - 1}}$

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:

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

Finding Degrees of Freedom

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

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

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

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

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

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

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

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)

$SS_{total} = \Sigma X^2 - \frac{G^2}{N}$ $\quad df_{total} = N - 1$

$SS_{between} = \Sigma\frac{T^2}{n} - \frac{G^2}{N}$ $\quad df_{between} = k - 1$

$SS_{within} = \Sigma SS_{within\ (each\ condition)}$ $\quad df_{within} = N - k$

$MS_{between} = \frac{SS_{between}}{df_{between}}$ $\quad F = \frac{MS_{between}}{MS_{within}}$

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

K) Pearson Correlation (Ch. 11)

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

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

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

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

L) Chi-Square Statistic (Ch. 12)

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