Statistics Reference Sheet: Cindy Blackstock, January 1, 2010

Statistics Test	Object of the Test	Dependent Variable	Independent variables/ grouping factor	Assumptions	New Tests and Roles
ANOVA	Does the factor have a significant effect on the outcome variable **(IE: Outcome variable is test score and factor is temperature (3 levels)**	One Continuous	One Categorical Grouping Factor	Observations Independent outcome variable normally distributed within each level of the factor Homogeneity of Variance - pop. Variances within each level are not significantly different - Levene's Test	**Levene's Test** - tests homogeneity of variance
Factorial ANOVA	main effects of each factor on outcome variable and an interaction effect of factors **(IE: Outcome variable is test score and grouping factors are temperature (3 levels) and humidity (2 levels)**	One Continuous	Two or More Categorical Grouping Factors	Observations Independent outcome variable normally distributed within each cell Homogeneity of Variance - pop. Variances within each cell are not significantly different	**Levene's Test** - tests homogeneity of variance
Factorial MANOVA	main effects of each factor on outcome variable and an interaction effect of factors **IE: Outcome variables are aggression and test scores and grouping factors are temperature (3 levels) and humidity (2 levels)**	Two or More Continuous	One or More Categorical Grouping Factors	Observations Independent outcome variable have multi variate normal distribution within each cell Homogeneity of variance and co variance assumption	**Bartlett's tests** whether outcome variables are correlated or not Box's test's homogeneity of variance and co variance
ANCOVA	Main effects of each factor on outcome variable controlling for covariate Interaction effect - controlling for co-variate is effect of the grouping factor equal across levels of the other factor? **IE: outcome variable is test score and factors are room temp (3 levels) and humidity (2 levels) and covariate is IQ**	One or More Continuous	One or More Categorical Grouping Factors One continuous covariate	Observations are independent The outcome variable is normally distributed within each cell/group Homogeneity of Variance - population variances of the outcome variable within each cell level are not significantly different use Levenes for this	**Homogeneity of Slopes** Is there an interaction between covariate and factor? To answer include interaction effect in model and if significant leave in the model. If not remove it and re-run the analysis
Repeated Measures ANOVA (Option1)	Main effect of each factor on outcome variable Main effect of time - is the mean of the difference score (score 2-score1) sign. Different from zero **IE: Outcome variable is test score, test administered twice at beginning of term (test one) and end of term (test 2) No between subject factors**	One or More Continuous - measured more than once on the same subjects	There may or may not be categorical grouping factors	Difference scores are independent The outcome variable (difference) is normally distributed	If there are 2 tests one time or 2 tests over time then univariate If there are more than 2 it is multivariate
Repeated Measures ANOVA (Option2)	Main effect of each factor on outcome variable Main effect of time - is the mean of the difference score (score 2-score1) sign. Different from zero **IE: Outcome variable is test score, test administered twice at beginning of term (test one) and end of tern (test 2) and the between subject factor is room temper ature.**	One or more continuous measured more than once on same subjects at different points of time or under different conditions (within factor).	There may or may not be a grouping factor (between)	Difference of scores are independent Outcome variable (difference score) is normally distributed within each cell Homogeneity of variance assumption - the difference score within each cell are not significantly different	**Difference Scores** When thinking how many outcome variables - THINK - how many difference scores are there - not how many scores there are
Repeated Measures ANOVA (Option 3)	Main effects of each factor on the outcome variable (1) Main Effect of term: are the means of difference scores different (score2-score1 and score 3-score2) interaction effect - is the effect of one factor equal across levels of the other factor? **IE: Outcome variable is test score, test is administered three times, at the beginning of the term (score 1), mid term (score 2) and end of term score 3) and between subjects factor is room temp.**	One or more continuous - measured more than once on the same subjects at different points of time (within) or under different conditions (within)	There may or many not be grouping factors (between)	Difference scores are independent The outcome variable (difference) have a multi variate normal distribution in each cell Homogeneity of variance assumption- pop variances for each outcome variable of each difference score) are not significantly different (MAUCHLY's) Use LEVENEs to test if variance of each different score equal across all levels difference scores within each within factor	**Mauchly's test of sphereicity** tests homogeneity of variance