

Chapter 11 – Analysis of Variance (ANOVA)

Chapter Outline

- I. Problem 11.1: One-Way (or Single Factor) ANOVA
 - A. Use of the One-Way ANOVA
 - 1. Compares two or more independent groups on the dependent variable.
 - 2. Compares the means of the samples or groups in order to make inferences about the population means.
 - 3. Also called a single factor ANOVA because there is only one independent variable or factor (the IV has nominal levels or a few ordered levels).
 - B. Assumptions of the ANOVA
 - 1. Observations are independent (the value of one observation is not related to any other observation).
 - 2. Variances of the dependent variable are equal across the groups.
 - 3. The dependent variable is normally distributed for each group.
 - C. Robustness of ANOVA
 - 1. Can be used when variances are only approximately equal if the number of subjects in each group are equal.
 - 2. Can be used if the dependent variable data are even approximately normally distributed.
 - 3. Post hoc test selection will be dependent upon whether the assumption of equal variances has been violated.
 - D. Follow the directions in the book to compute and interpret a one-way ANOVA.
- II. Problem 11.2: Post Hoc Multiple Comparison Tests
 - A. Purpose of post hoc multiple comparison tests (follow-up tests).
 - 1. Utilized when you compare three or more group means and the overall (omnibus) F is statistically significant.
 - 2. Allows you to determine which pairs of means are significantly different.
 - 3. You do not do a post hoc test if the overall F is not statistically significant.
 - B. Characteristics of various post hoc tests.
 - 1. LSD (least significant differences) post hoc test is quite liberal.
 - 2. Scheffe test is quite conservative.
 - 3. Tukey HSD (honestly significant differences) post hoc test is a middle of the road test if the Levene test was not significant.
 - 4. Games-Howell test is a middle of the road test if the Levene test was significant.
 - C. Follow the directions in the book to compute and interpret a post hoc test for a one-way ANOVA.
- III. Problem 11.3: Nonparametric Test (Kruskal-Wallis)
 - A. Use of the Kruskal-Wallis
 - 1. Use if the homogeneity of variance assumption is violated.

2. Use if data is ordinal.
 3. Use if the assumption of normality is violated.
 - B. Follow the directions in the book to compute and interpret a Kruskal-Wallis test.
- IV. Problem 11.4: Two-Way (or Factorial) ANOVA
 - A. Purpose of a two-way ANOVA
 1. Allows comparison of two or more groups based on two independent variables.
 2. Appropriate for a between groups design.
 - B. Follow the directions in the book to compute and interpret a two-way ANOVA.