PSYC 5301: Research Methods

Tarleton State University — Homework 5

Note: For each of the problems below, you should use a spreadsheet program to structure each data set as a CSV file. Then, use the classical and Bayesian ANOVA functions of JASP to answer the questions that follow.

1. A study investigated the effectiveness of small-group tutoring and the effectiveness of a classroom instruction technique known as *hot math* (Fuchs et al., 2008). The hot math program teaches students to recognize types or categories of problems so that they can generalize skills from one problem to another. The data below is a math test score for each student after 16 weeks in the study.

	No tutoring	With tutoring
Traditional instruction	3,6,2,2,4,7	10,4,5,8,4,6
Hot math instruction	7,7,2,6,8,6	8,12,9,13,9,9

   (a) Sketch a plot of the condition means implied by this experimental design. Plot instruction type on the horizontal axis and separate lines for each level of tutoring group.

   (b) Perform a factorial analysis of variance on these data. Report p-values for the main effects of instruction type and tutoring group and the interaction.

   (c) Perform a Bayesian analysis of variance on these data. Compute and report inclusion Bayes factors for each main effect and the interaction, being sure to report the prior and posterior odds for each.

   (d) Interpret your results in the context of the problem.

2. A researcher conducted a two-factor study comparing users of a particular social media platform with non-users for three different grade levels: middle school, high school, and college. For consistency across groups, grades were converted into six categories, numbered 0 to 5 from low to high. The data are below:

	Middle school	High school	College
User	3,5,5,3	5,5,2,4	5,4,2,5
Non-user	5,3,2,2	1,2,3,2	1,0,0,3

   (a) Sketch a plot of the condition means implied by this experimental design. Plot grade level on the horizontal axis and separate lines for each level of user type.

   (b) Perform a factorial analysis of variance on these data. Report p-values for the main effects of grade level and user type and the interaction.

   (c) Perform a Bayesian analysis of variance on these data. Compute and report inclusion Bayes factors for each main effect and the interaction, being sure to report the prior and posterior odds for each.

   (d) Interpret your results in the context of the problem.

3. Consider the following data from an experiment designed to examine the effect of an audience on the performance of two different personality types. These data represent the number of errors made by each participant in a task:

	No audience	Audience
High self-esteem	3,6,2,2,4,7	9,4,5,8,4,6
Low self-esteem	6,7,2,6,8,6	8,14,11,15,11,11

   (a) Sketch a plot of the condition means implied by this experimental design. Plot audience type on the horizontal axis and separate lines for each level of self-esteem.

   (b) Perform a factorial analysis of variance on these data. Report p-values for the main effects of audience type and self-esteem and the interaction.

   (c) Perform a Bayesian analysis of variance on these data. Compute and report inclusion Bayes factors for each main effect and the interaction, being sure to report the prior and posterior odds for each.

   (d) Interpret your results in the context of the problem.