Title Page:

Title of Report, names of all group members, group number

Body of the report

The body of the report must be single-spaced, 1 inch margins, 12 point font. All plots should be integrated into the body of the report (not stapled on the end). Do NOT include plots or tables that are not described in the text of the report. Plots do not need to be full-page. The report may be double-sided, but does not need to be. The entire report must be 8 pages or less including all parts listed below. I expect most will be 4-6 pages long.

Section I: Introduction and how this experiment fits the mold of a complete factorial experiment.

Sentence 1: The purpose of this experiment is to determine the effect of Factor A and Factor B on the response variable.

The next sentences should explain what factor A and B are if it is not evident by your jargon. Also it should explain what the response variable is if it is not evident. This means that if you are doing something specific to your major and I, a lay person not in your major, would not know what the jargon means, then you need to explain it to me well enough that I can follow this report. You need to give me some background knowledge. This set of sentences may be unnecessary (or may be very short) for some groups’ experiments.

The next set of sentences should be a description of why you think this is an interesting experiment. Why do you think the factors will affect the response? What was your hypothesis about the outcome of the experiment before you conducted it? Also, these sentences should give me, the lay person reader, a mental picture of what you plan to do. Not in minute detail, but just so I can understand the experiment.

The next set of sentences should tell a bit more about the procedure. How do you plan to measure the response variable? What will the experimental units be? How many experimental units are there? How many treatments? How many replicates per treatment? What will be the controlled variables (if any), and why? What will be the blocking variables (if any) and why? When you answer why to the previous two questions, you should speak in terms of experimental error.

The next set of sentences should describe in detail how you use randomization in this study. A good example of how much detail you need is problem 4 (and 5) on Test 1. You need to give me enough detail that I know that you did it right! Remember you may (depending on your experiment) randomize several different things---for example, assigning experimental units to
treatments may be randomized, and the order in which you perform the experiment on the experimental units may be randomized.

**Section II: Detailed experimental protocol, pitfalls, and data.**

This section should describe in detail how the experiment was carried out so that another person could perform the experiment if they have your level of expertise. Any jargon you use that would not be obvious to a lay person should be explained. Yes, you can cut and paste the protocol you’ve already done, with any corrections resulting from the peer reviews.

The last part of this section should describe any unexpected glitches that occurred when you performed your experiment, and if you had none, tell me you had none.

**Section III: Data analysis**

This section should begin with a table presenting your data in un-stacked form. Try your best to get this on one page. Since many of these experiments are small, you may be able to draw conclusions just looking at the numbers. Do any of the treatments show signs of gross experimental error? (Remember the airplane example.) Write a few sentence or two about what you see in the raw data.

Now present a table of treatment means and marginal means. Tell me what you see. Is the presence of an effect of Factor A or B evident from this table alone? Next you will present boxplots for each level of Factor A, and boxplots for each level of Factor B. Again, talk about what you see as it informs the objective of your experiment—determining whether there are effects of Factors A and B.

Then you need an interaction plot. Embed this plot close to the text that describes it. The plot should be clearly labeled. You should have a paragraph explaining what the plot tells you about the results. You should mention whether the traces are parallel and state what you believe about the presence of an interaction effect so far.

Next, you should present a full model ANOVA table. You should have a paragraph that describes this table. The paragraph should explain that you are using this table to assess the statistical significance of the interaction effect. You should write the full model at some point and explain that you are trying to determine whether or not to keep the interaction term. State the null hypothesis. You should tell what the interaction p-value is and draw whatever conclusion it leads you to draw.

If the interaction effect is insignificant, you will do an additive model ANOVA table and describe what questions you are trying to answer with this ANOVA table. You may have to do a single-factor ANOVA table next if one factor is insignificant. For each table, you should describe what it is you are looking for (pvalues!), what hypothesis they are testing, and thus what they allow you to conclude in your backwards elimination model selection process. Each
ANOVA table should be embedded in the text close to the text it describes. You will state the final model.

Section IV: Discussion/Conclusions

Once again state your final model. How do you interpret your final results? Do these factors help explain variability in the response? What would be your point prediction of a response variable for each treatment? Is there a best treatment or is there a best level of a factor? How did your actual results compare to what you expected? What would you do differently if you knew then what you know now?