

PSYC602 - Homework #3

1 Notes

1. Complete this homework as a .Rmd file and submit the knitted .html file via ELMS.
2. A GRADE WILL BE ASSIGNED FOR THIS PROJECT. In completing this assignment, you may consult any text or other written materials you wish. You may NOT discuss the project with anyone other than your instructor or class TAs until after the due-date given above.
3. You have only a single opportunity to complete this assignment. Late papers will be downgraded the equivalent of one letter grade.

2 Scenario - Part I

You have done so well on your second job as a statistical consultant that you are now being sought out for your advice regarding analysis of variance. An entirely different breed of researcher from those who confronted you in your first assignment presents data on four groups, and wishes to know whether there are mean differences among the groups.

The researcher helpfully mentions that you should include `options(contrasts=c("contr.sum","contr.poly"))` at the beginning of your R file in order to make sure you get the appropriate comparisons for your ANOVA models.

3 Tasks - Part I

In your desire to answer such a question, you decide to:

1. State the model under investigation
2. State H_0 , both formally (in terms of population parameters) and in words, for both the fixed and random models
3. State H_1 , both formally (in terms of population parameters) and in words, for both the fixed and random models
4. Select an error rate
5. Conduct an ANOVA these data using `lm()` `anova()` and `aov()` for both the fixed and random models
6. Produce time-series plots of y and e (that is, separately plot y and e vs. observation number) using `qplot()`
7. Create and print a data.frame with y , \hat{y} , and e for each observation
8. Use `cor()` to calculate the correlations among y , \hat{y} , and e , and use `print()` and `xtable()` to produce an html table of the correlations.

9. Use `ggpairs()` to display all pairwise scatter plots and correlations among y , \hat{y} , and e
10. Use `qplot()` to plot the mean of y as a function of the group membership variable
11. Interpret the results so far

4 Scenario - Part II

Now assume that the same researcher returns to you again with the above results in hand, and asks how he can further appreciate his data. You decide to perform Scheffé and Bonferroni pairwise comparisons tests to help him.

1. What it is that you are doing for him
2. Conduct Bonferroni adjusted comparisons using `pairwise.t.test()`
3. Conduct Scheffé's test using `scheffe.test()` from the `agricolae` package
4. What do the results of your tests show, above and beyond the results you discussed for Part I
5. How do the two tests differ?
6. Draw any further conclusions you believe are merited, based on your comparison tests, in which you indicate the model you believe gave rise to the data

5 Data

These data are included as `hw3.csv` on ELMS

y	Group
1	1
2	1
3	1
2	1
3	2
2	2
3	2
4	2
4	3
3	3
5	3
4	3
4	4
3	4
2	4
3	4