

Homework 5

Type all homework.

Due date: See syllabus. Turn in on Bruin Learn.

You may use any R package to answer these questions.

All data sets are available on the book web site <https://robweiss.faculty.biostat.ucla.edu/book-data-sets> in text formats. Data sets are described briefly in the book appendix A.

1. Dental Data, continued. For the fixed effects, use the model with intercept, gender, time and time*gender. Now fit as many (*at least* 10) different covariance models as you can. Be sure to include the independence covariance model and the unstructured covariance model.
 - (a) Create a table summarizing the results of the fitting. Include co- variance name, number of parameters, $-2 \log$ likelihood, AIC and BIC. Do a likelihood ratio test of each model against the independence model and against the unstructured covariance model.
 - (b) Which covariance model fits best? Discuss.
2. Discuss more general covariance models for the Dental data.
 - (a) For the covariance structure, are there any models that are MORE GENERAL than the ones you have already fit to this data? Discuss.
 - (b) What is the most complicated covariance model that can be fit to this data? (Hint: See next question.)
 - (c) Fit separate UN covariance models for the boys' data and the girls' data, report the variances and correlations. Summarize the differences in a sentence or two.
 - (d) Fit the RI and CS models. What is the difference between these two models? [Note: in 2023 and future years, not to be turned in until we have a competent covariance model software in R.]
 - (e) Decide if the model with separate covariance models for boys and girls fits better than the model with a single covariance model for all participants.
 - (f) Does your answer to the previous question change if you remove the outlying observations?
3. Write a two-paragraph summary of all of your results for the doctor who collected this data. Give all of your conclusions. Your write-up should include the analyses from previous homeworks as well as this current homework. Discuss the findings from your graphical analysis, the fixed effects analysis and the covariance modeling. Include a few key numerical results as well as qualitative conclusions.