

PS4

Edu 252L

- Due 3-8 at noon
- Instead of submitting via canvas, please email ONE (1) group copy to bdomingue@stanford.edu. This will make it easier for me to share feedback with entire group.
- Word or pdf are fine. If you submit a pdf, please be sure to include line #s.

1. Let's return to the generic idea of fit statistics about which I think there was some confusion. See [here](#).

2. DIF: A standard approach to analyzing differential item functioning is to use logistic regression and condition on the observed sum score for a respondent. This is covered in Section 7.4 of Camilli. Specifically, note Eqn 19. We clearly expect an association between response and ability, so β_1 should be large. β_2 , on the other hand, should be small if there is no DIF (β_3 tells us about nonuniform DIF, we shall omit that for the moment). So, consider the following:

1. Get this [data](#).
2. Create sum scores for just the **reading** items (those with column names beginning "r.mc"). Split those into high and low scores (you might want to ask how sensitive results are to choice of split, I'll leave that as a bonus exercise). This will play the role of G in Eqn 19 from Camilli.
3. Estimate sum scores for the math items. These will play the role of X in Eqn 19.
4. Estimate eqn 19 for each math item. We are looking for items that function differently for those with high and low reading abilities. Report what you find. Is anything concerning?
5. BONUS: Does your answer change if you consider theta estimates in place of sum scores for step 3?

3. Polytomous data: [This](#) dataset is an empirical item response dataset with polytomously coded items. Let's consider the information in the polytomous data versus what would happen if we dichotomized the data. See [here](#).

4. [Not required, but highly recommended if you want to better understand the EM Algorithm.] Let's return to the coins problem. This [source](#) is an implementation of the EM algorithm in R [Feel free to try writing your own based on the algorithm described in the article before you look at my version.]. Once you have an implementation working, [this](#) examines some questions about estimation in this particular coin problem.