

1. 1. This homework assignment uses the data set (math36.sav) that consists of the results of a single administration of a university's 36-item math placement exam to 1,043 incoming students. All items were multiple-choice items that had four alternatives. Note that you need to score them dichotomously before fitting IRT models.
 - a. Fit the 1PL, 2PL, and 3PL models to this data set using the default BILOG settings, with the exception of setting the number of alternatives to 4, and report the estimated item parameters in three separate tables.
 - 1) Does it appear reasonable to assume all the items having an equal slope (i.e., Rasch model)?
 - 2) Does it appear useful to include a guessing parameter in the model?
 - 3) Evaluate the goodness of fit of the items with the option of the chi-square test performed by BILOG. Are there misfitting items?
 - 4) Evaluate the overall fit of the model. Which model do you prefer for this data?
 - 5) Using the estimates obtained from the model you choose in part (4), identify the most and least discriminating items. Which item is most informative at $\theta = -1.5$? At $\theta = 0$? At $\theta = 1.5$?
 - b. Determine which set of 10 items will give the maximum information for an examinee with a true score of 20. Compare the accuracy of this shorter exam to the accuracy of the entire exam for examinees at this ability level.
 - c. Assume a student with a true score of 8 on the 10-item set you selected in part (b) should be qualified to place into an advanced section. Approximately what estimated θ value corresponds to a true score of 8 on the 10-item test in part (b). Report the estimated standard error of the ability estimate for the examinee with the true score of 8.
2. Suppose for three items, $\beta_1 = -1.5$, $\beta_2 = .5$, and $\beta_3 = 2.0$. Suppose a student answers two items correctly. Compute a probability that each item is answered correctly without knowing the student's ability.