In Section 2.2.1, R & M point out that the mean of a binary (0/1) variable can be interpreted as an index of the item’s difficulty. (a) In simple language, explain their argument for why this makes sense. (b) We also use the mean as an index of the difficulty of a continuous item (e.g., 1-5 Likert scale). Based on your answer to part (a), do you see why? Explain.

1. To first start and understand what is happening when we take the mean of a binary variable we need to understand what the mean between 0 and 1 represents. As R & M Points out in the text, the mean of a binary variable is the probability of solving the item (Or getting it “correct”). For example, assuming “1” represents the correct answer to the item, if a researcher takes the mean score of a binary item in a sample and 36% of individuals answer 1 then the estimated probability of answering the item correctly is 36%. Be aware, also according to R & M, this requires empirical data and needs to be retested in multiple settings. However, the item difficulty can be estimated using this method. By getting a collection of how often the sample is getting answer correct and incorrect, it is possible t gauge the difficulty of the items.
2. Yes, I do see why it is possible to also use this estimation to create an index of difficulty to continuous items. By indicating the mean (and other central tendency measures) then the researcher is getting at what the most likely response choice is within the continuous scale. Therefore, if the mean is 3 on a scale of 1-5, then the “easiest” item to answer is a 3. I say “easiest” because although the concept is the same, depending on the context, the difficulty may relate more to the commonality of a response. Therefore, using this mean score of 3, then 1 and 5 are more likely to be the outliers and serve as more difficult of a response to get. However, this is the same method as mentioned in part A. The difference is that it is possible for there to be multiple difficult answers.