

## Homework 5 Due date: May 4

Question 1 and 2 are based on the attached data “102 年臺北 10-18 歲兒少問卷.csv”. Your codes submitted to iLMS should be able to read the data and perform all necessary analyses. The variables are explained in the file “102 年臺北 10-18 歲兒少問卷\_變數”.

1. Please conduct the correspondence analysis for questions A3(年級) and B7 (運動天數). You should provide an asymmetric plot with principal coordinates for A3 and interpret your observation. What is the total inertia and what are the respective inertia for the first two coordinates?
2. Please use the questions in set B10, C9, and C10 to perform factor analysis. There are in total 49 questions and 1508 observations. Use PC method, PF method and MLE method to derive the loading coefficients and rotate the results with both varimax and quartimax method. Compare the results and select one combination to conclude your analysis.
3. Prove the inequality in the class note:  
$$S - (\tilde{L}\tilde{L}' + \tilde{\Psi}) \leq \tilde{\lambda}_{m+1}^2 + \tilde{\lambda}_{m+2}^2 + \cdots + \tilde{\lambda}_p^2$$
where  $\tilde{L}$  and  $\tilde{\Psi}$  are the loading matrix and uniqueness matrix estimated with the principal component method, and  $\tilde{\lambda}$ 's are eigenvalues of  $S$ .

Please upload a report for your answers and a script file for your codes.