

**Important Notes:** Please follow the following guidelines to write your report.

- This is a formal exam, discussions with other people **are prohibited**.
- The report should include a title page with your **Name and ID**, while the length of your report (not including the title page) **must not exceed 8 pages**.
- Please (i) address the problem and introduce the data; (ii) describe the basic ideas of each method you use in this report; (iii) attach necessary outputs and plots; and (iv) carefully summarize and comment on the results.
- **Do not attach any R code** in your report.
- Writing either in **English or Chinese is fine**.
- Print out the report and turn in a hard copy.

- 1) Download “[European\\_Jobs.txt](#)” and “[European\\_Jobs\\_Description.txt](#)” for the data set and its detailed variable description.

**Q1:** Perform a complete **Principal Components Analysis** for this data and interpret the result.

Note: The number of PCs must be determined by a statistical hypothesis test along with the proportion of total variation accounted, while the relationships among objects and variables can be interpreted by using a 2D plot.

- 2) Download “[Sales.txt](#)” and “[Sales\\_Description.txt](#)” for the data set and its detailed variable description.

**Q2:** Separate the 7 variables into 2 groups. The first group has 3 variables V1, V2, and V3. The second group has 4 variables V4, V5, V6, V7. Perform a complete **Canonical Correlation Analysis** for these two groups of variables and interpret the result.

- 3) The “[Fathers\\_Sons.txt](#)” data in the 7×7 contingency table describes the occupation of fathers and sons. The detailed description of the occupations is shown in “[Fathers\\_Sons\\_Description.txt](#)”.

**Q3:** Perform a **Simple Correspondence Analysis** on this data set and interpret the result.

- 4) The file “[Questionnaire.txt](#)” contains students’ responses to a questionnaire about the course “Multivariate Analysis”. There are 8 students, 31 questions, and 5 response levels to each question (see “[Questionnaire\\_Description.txt](#)” for detail).

**Q4:** Perform a trustful **Multiple Correspondence Analysis** on this data set and interpret the result (Note: Using a 2D plot to interpret the result).

**Q5:** Based on the 2D plot in Q4), can we say that students have a consistent response in “strongly agree” and “strongly disagree”? If yes, in what questions they have consistent responses?

- 5) Recall the “[European\\_Jobs.txt](#)” data in Problem 1).

**Q6:** Perform a complete **Factor Analysis** based on the MLE and interpret the result.

**Q7:** How do the factors obtained here compare to the principal components obtained in Q1)?