Homework 8 Due date: May 18

1. Please use the airline data of 許廷瑋 in Homework 1. Remove the missing data if there is any. Analyze it with Factor analysis using the 14 questions about satisfaction from **Inflight wifi service** to **Cleanliness**. Use PC method, PF method and MLE method with 3 factors to derive the loading coefficients and rotate the results with both varimax and quartimax method.
   (a) Select the combination with the maximum cumulative variance explained by the three factors. Interpret the result from your selected model according to the loading coefficients. (Variance explained by each factor is calculated by sum of squared coefficients for that factor.)
   (b) Use the method of your selection in (a) to generate factor scores for factor 1 and 2. Use regression method to derive the factor scores. Make a scatter plot between the two factor scores. Color the observations according to **gender**.
2. 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 both your codes and plots.