**Stat ST465/665, Project 8 - Challenge Project**

1. **(60 points)** This project is concerned with size measurement data for a certain kind of plant. The data is in the file Assignment8_data.xlsx. The reference is adapted from *R. Johnson and D. Wichern, Applied Multivariate Statistical Analysis, Pearson, New Jersey, 2019* by Don Estep in 2023.

   Name the variables $X1$, $X2$, $Y1$, and $Y2$ by column. The variables record lengths of a part of a plant in the same units.

   The goal of the project is to analyze the data and present a description of **meaningful** analysis and conclusions. The grading will be **heavily** weighted towards both accuracy and clarity and conciseness of presentation.

   For the analysis:

   - You may use any method covered in the course **except** factor analysis.
   - Do **not** scale the data. Use covariance matrices whenever relevant.
   - Justify every conclusion with evidence (numbers, vectors, matrices, plots). Remember that confirmatory evidence for any conclusion is critical.
   - If you process the data in any way, justify the action and document what you did. As above, confirmatory evidence to support any action is required.

   For the presentation:

   - Submit one PDF file for the analysis and discussion.
   - Complete and submit the report cover page as indicated. Reports without an accurate cover page will be given a score of 0.
   - Include all code used for the project as indicated. Reports that do not include the code will be given a score of 0.
   - The usual presentation standards will be followed. Presentations that are not neat and clear will be given a grade of 0.
   - Presentations that include plots, analysis results and discussion that are not meaningful will be heavily penalized.
   - Every part of the analysis, e.g., plots, matrices, numbers, must be explained. A presentation that consists of a lot of plots and numbers with no organization and/or explanation will be given a grade of 0.