### Problem1:

### Potential Study Analysis

A gauge repeatability and reproducibility study for a new height gauge was performed at the vendor location prior to shipment. Data was generated for 2 appraisers, each measuring 10 parts, 2 times. The results are located in the file **height.dat**. Perform a potential capability analysis, then answer the following questions. The part specification tolerance range is 480 to 495.

1. What are the degrees of freedom for the factor part?
2. What are the degrees of freedom for the factor appraiser?
3. What are the degrees of freedom for the factor part:appraiser?
4. What is the value for percent contribution for the Total Gage R&R?
5. What is the value for percent tolerance for the Total Gage R&R?

Problem2:

### Short Term Study

You have some short-term continuous gauge data from a study that you did recently. The data can be found in the file named: **Continuous ST R.dat**. You had 2 operators measure 25 different specimens 5 times each according to the procedures that you know for conducting short-term continuous data Measurement Systems studies. The study involved several different parts that were made to different targets (to exercise the range of the gage), but they all have the same specification which is 25 +/- 3.5 units for them all.

Based on your MSA analysis, answer the following questions.

1. Is there a part you should investigate, and if so, which one? Type NA if none of the parts should be investigated.
2. What is the value for the Pearson Product Moment Correlation Coefficient for the mean and standard deviation for Operator 1?
3. What is the p-value of the test for the significance of the relationship between the mean and standard deviation for Operator 1? Record your answer to 4 digits after the decimal point.
4. What is the value for the Pearson Product Moment Correlation Coefficient for the mean and standard deviation for Operator 2?
5. What is the p-value of the test for the significance of the relationship between the mean and standard deviation for Operator 2? Record your answer to 4 digits after the decimal point.
6. What is the value for percent contribution for the Total Gage R&R?
7. What is the value for percent tolerance for the Total Gage R&R?
8. What is the number of distinct categories?
9. Which part has the lowest mean value when measured repeatedly?

Problem3

### Long Term Study

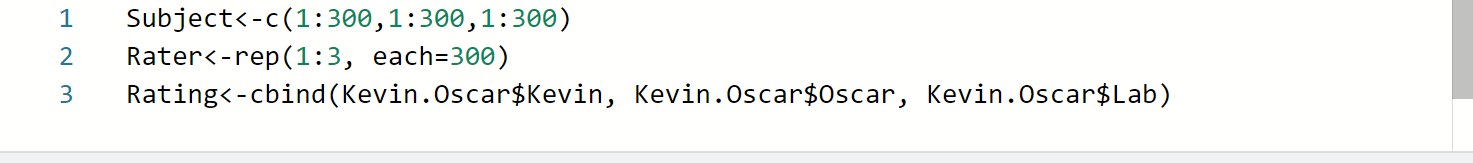
You are now involved in a long-term study of a continuous data measurement gauge. You have randomly selected 8 specimens from production that you have measured through time, once each day in random order. The study involved several different parts that were made to different targets (to exercise the range of the gage), but they all have the same specification which is 25 +/- 3.5 units for them all. Since this gauge is an automated gauge and hence has no presumed operator influence, you only have one set of measurements (from one operator) in this study. The data are in **Continuous LT R.dat**. The relevant variables are readily identifiable by looking at the data file. Based on your MSA analysis, answer the following questions.

1. What is the value for the Pearson Product Moment Correlation Coefficient for the mean and standard deviation?
2. What is the p-value of the test for the significance of the relationship between the mean and standard deviation? Record your answer to 4 digits after the decimal point.
3. What is the value for percent contribution for the Total Gage R&R?
4. What is the value for percent tolerance for the Total Gage R&R?
5. What is the number of distinct categories?

Problem4:

Kevin and Oscar are inspectors working at a local paper company. Both inspectors are responsible for the 100% inspection of reams of paper. Each inspector randomly selects a ream of paper off the production line, takes it to a light booth, and examines the ream of paper for any signs of damage. The statistical facilitator, Pam, is aware of some recent complaints from customers, is concerned that Kevin and Oscar may not be in perfect agreement insofar as their analysis of the reams of paper are concerned (which is based simply on a GOOD or BAD assessment). As a result, the facilitator decides to conduct a concordance analysis between the raters. Selecting a random sample of 200 reams of paper from the production line, she marks each ream of paper with an index number in a covert location on the side of each ream. Then, she has each of the inspectors assess each unit (in a random sequence) as GOOD (1) or BAD (2). Prior to Kevin and Oscar’s assessment, Pam sent the 200 reams of paper to a local lab to be visually evaluated by expert paper inspectors. Their assessment is included in the file and should be used as the standard for an assessment of validity. The data collected are recorded in the file **Kevin Oscar.dat.**

Based on your Discrete MSA analysis, answer the following questions.

1. With respect to concordance (agreement between Kevin and Oscar), how many specimens did both Kevin and Oscar agree were good?
2. What is the point estimate for Kappa with respect to good vs bad? Record your answer to 4 places after the decimal point.
3. What is the lower confidence interval for Kappa with respect to good vs bad? Record your answer to 4 places after the decimal point.
4. What is the upper confidence interval for Kappa with respect to acceptable vs unacceptable? Record your answer to 4 places after the decimal point.
5. With respect to the assessment of validity, what is the point estimate for Kappa for Kevin compared to the lab? Record your answer to 4 places after the decimal point.
6. With respect to the assessment of validity, what is the point estimate for Kappa for Oscar compared to the lab? Record your answer to 4 places after the decimal point.
7. Use the following code to reorganize the file for calculating Overall system validity with Light’s G. What is the point estimate for Light’s G? Record your answer to 4 places after the decimal point.

Problem5:

Jeff and Steve are expert tasters for the Best Beer Company. In an effort to determine the level of concordance associated with the two judges, each has sampled and evaluated 250 specimens. Each specimen tasted has been assessed by each judge on a scale corresponding to four categories:

1: ACCEPTABLE

2: NOT ACCEPTABLE-GRAINY

3: NOT ACCEPTABLE-METALLIC

4: NOT ACCEPTABLE-MUSTY

The data collected are located in the file named **Beer Assessment.dat.**

Based on your Discrete MSA analysis, answer the following questions.

1. How many specimens did both Jeff and Steve agree were acceptable?
2. What is the point estimate for Kappa with respect to acceptable vs unacceptable?
3. What is the lower confidence interval for Kappa with respect to acceptable vs unacceptable? Record your answer to 4 places after the decimal point
4. What is the upper confidence interval for Kappa with respect to acceptable vs unacceptable? Record your answer to 4 places after the decimal point
5. With respect to the comparison of unacceptable categories, what is the point estimate for Kappa for all three unacceptable reasons? Record your answer to 4 places after the decimal point
6. With respect to the comparison of unacceptable categories, what is the p-value of the test for symmetry? Record your answer to 4 digits after the decimal point
7. With respect to the comparison of *Grainy* to the other unacceptable categories, what is the point estimate for Kappa? Record your answer to 4 places after the decimal point
8. With respect to the comparison of *Metallic* to the other unacceptable categories, what is the point estimate for Kappa? Record your answer to 4 places after the decimal point
9. With respect to the comparison of *Musty* to the other unacceptable categories, what is the point estimate for Kappa? Record your answer to 4 places after the decimal point