



1. JMP data table: *thickness data*

- a) The specification limits for *thickness* are (170, 175). Fit a Normal distribution to *thickness*.
- b) Give the predicted future percent out of spec.
- c) Give the percentage of data points that are out of spec.
- d) What are the 3 best fitting distributions?



2. JMP data table: *time to failure*.

- a) Identify the life distribution giving the best fit to this data. Use this distribution to answer questions (b) and (c).

- b) Give the most likely failure probability at 900 hours.

- c) Give the worst-case failure probability at 900 hours.



3. JMP data table: *msa 5 appraisers*

- a) This file contains pass-fail inspections of 15 parts by 5 appraisers. Each appraiser inspected each sample twice. Convert the file to the format needed for this analysis. Describe briefly what this format is.

- b) What is the agreement grand mean? (Round off to the nearest whole number.)

- c) Which two parts would be most useful in a follow-up discussion aimed at understanding the causes of disagreement among the appraisers?

- d) Assuming % agreement is a good proxy for % correct, which appraiser represents the greatest opportunity for improvement?



4. JMP data table: *development testing*

The first iteration in a product development project fell short of expectations. The team conducted a second iteration, hoping to see improvement. There are two key performance indicators: Y1, a higher-is-better continuous measurement, and Y2, a pass-fail test. The two variables are independent of each other. Perform the following before/after analyses. Record the P values to 4 decimal places.

- a) Test for a difference in Y1 between the first and second iterations. Give the P value and state your conclusion.

- b) If there was a significance difference in (a), did it go in the right direction?

- c) Test for a difference in Y2 between the first and second iterations. Give the P value and state your conclusion.

- d) If there was a significance difference in (c), did it go in the right direction?



5. JMP data table: *stratification by PN*

A project team wants to determine whether or not some of the part numbers have significantly higher scrap rates than other part numbers. If so, they want to identify the part numbers with the highest scrap rates.

- a) Convert the file to the format needed for this analysis. Describe briefly what this format is.

- b) Test for differences in the scrap rate among the 6 part numbers. Give the P value (4 decimal places) and state your conclusion.

- c) If there are significant differences, which 3 part numbers have the highest scrap rates? What are these scrap rates (percentages with 2 decimal places)?

6. We want to design an optimization experiment.

- The anticipated RMSE is 2, the difference to detect is 3. What is the required AVP (3 decimal places)?
- The experiment will involve two categorical factors K1 and K2 and two continuous factors C1 and C2. List the terms in the corresponding response surface model (excluding the intercept).
- Each of the categorical factors K1 and K2 has 4 levels. Find the required sample size.



7. JMP data table: *approximate tool matching*

The 3 tools are electron microscopes. The Y variable (*Meas error*) is the measurement error when measuring dimensions in the nanometer range. The tool matching is approximate because we want to minimize the measurement error for each tool, and the minimized measurement errors will be different.

- a) Run the Fit Model script in the left panel. Remove insignificant terms from the model, then run the reduced model. List the terms in the reduced model and their P values (4 decimal places).
- b) Give the RSquare Adj (6 decimal places).
- c) Give the RMSE (6 decimal places).
- d) Give the error degrees of freedom.
- e) Use the “lock factor setting” method to find the average value predicted for each tool in the future state.



- f) Give the standard deviation predicted in the future state.
- g) For each tool, use the *t distribution calculator* to predict the percentage (2 decimal places) that will exceed 3.5 in the future state.
- h) Which tool is predicted to perform the worst?