

Exam 2 – Take home portion (75%)

Notes:

- Bring your printed exam (this document filled in with answers to the following questions) to class, to be turned in at the end of class Tuesday. Try to make this document stand-alone, so that it makes sense without a spreadsheet or R code (e.g., insert graphs and modeling results as appropriate, explain what you did to get your results).
- Please name the file with supporting calculations using this format:
Exam2_yourname.xlsx or Exam2_yourname.R, and email the files by the start of class on Tuesday to: chris@lithoguru.com.

The Octane data found in Data_Sets_2.xlsx shows how three different materials in the feed stock and a composite variable describing processing conditions affect the octane rating of refined gasoline. Since higher octane is worth a lot of money to a refinery, we wish to build a multiple regression model to predict resulting octane depending on feed stock composition and processing conditions.

1. Generate an OLS model with all main effects included. Perform standard regression diagnostics on this model. What can you conclude?
2. Next, generate a subset model with the least significant main effect excluded. Compare these two models using all of the model comparison tools we have learned. What can you conclude?
3. If your goal was to produce gasoline at an octane rating of 95, pick one set of operating conditions that would do so. Make sure that this operating condition set is within the scope of the model (that is, within the ranges for each variable used to build the model).