

**Statistics 506**  
**Test 1**

1. Consider the following results from a  $2^3$  factorial experiment.
  - (a) Construct a cube plot
  - (b) Compute effects. Which effects seem important?
  - (c) Using only important effects, what is the EMR if we want to maximize the response?
  - (d) Using only important effects, what factor settings should we use if we want a target EMR of 40?
  - (e) Using all effects, what is the EMR if we want to maximize the response? Comment on any differences with the answer you obtained when including only the important effects.

(A,B,C)	Unit sales
(-1,1,1)	32.2
(1,-1,-1)	39.0
(-1,-1,1)	27.4
(1,1,1)	47.5
(-1,-1,-1)	37.9
(1,-1,1)	51.0
(-1,1,-1)	39.0
(1,1,-1)	36.9

2. The service time (in minutes) at DMV is recorded for all possible combinations of: Arrival time (10 AM vs. Noon), Day (Tuesday vs. Friday), and Transaction (Driver's License Renewal vs. Title Transfer).
- Compute the factor effects and construct a normal plot. Which effects are important? If any two-way effects are important, construct an interaction plot.
  - Sometimes, interactions can occur because the data is skewed on the original scale. Transform the waiting times by taking their log (either natural log or base 10 log is fine). Re-analyze the data. Compare this analysis to the analysis on the original scale. What are advantages and disadvantages of the two approaches?

Arrival	Day	Transaction	Service Time
10 AM	Tues	DL	9.0
Noon	Tues	DL	24.5
10 AM	Fri	DL	5.5
Noon	Fri	DL	16.4
10 AM	Tues	TT	27.1
Noon	Tues	TT	60.3
10 AM	Fri	TT	24.5
Noon	Fri	TT	66.7