

**Applied Statistics Comprehensive Examination****Statistical Methods I & II**

1. (20 pts) A large insurance company wishes to estimate the proportion of its drivers who qualify for a “safe driver” plan (with reduced rates on liability insurance for drivers with no accidents or traffic violations within the previous three year period). A random sample of 200 policy holders was obtained and showed that 59 of these policy holders would qualify for the “safe driver” plan.
  - (a) (10 pts) Construct a 90% confidence interval for the true proportion of policy holders who would qualify for the “safe driver” plan.
  - (b) (10 pts) Estimate the required sample size for the sample proportion to be within 3 percentage points of the true population proportion with 95% confidence.
  
2. (35 pts) A random sample of 36 drinks from a soft drink machine has an average content of 23.8 ounces with a standard deviation of 1.42 ounces.
  - (a) (20 pts) Using a 5% level of significance, determine if these data provide sufficient evidence to conclude that the mean content from this machine is less than 24 ounces.
  - (b) (15 pts) Estimate the power of the test in part (a) assuming a mean content of 23.5 ounces.
  
3. (45 pts) Three brands of paint were compared in an experiment where each brand of paint was applied to six panels and placed outside in the weather. The response variable was the time in months before the paint started to peel and the resulting data are summarized in the following table:

Paint	Sample Size	Mean	Standard Deviation
A	6	48.6	7.1
B	6	51.2	7.8
C	6	60.1	7.5

- (a) (10 pts) State the appropriate mathematical model and all of its assumptions for this experimental situation.
- (b) (15 pts) Use these data to construct the ANOVA table and determine if there are treatment differences, using  $\alpha = 0.05$ .
- (c) (10 pts) Use Fisher’s protected LSD test to make pairwise comparisons among the paint brands. Summarize and interpret your results using the traditional underlining method.
- (d) (10 pts) Estimate the common variance,  $\sigma^2$ , with a 95% confidence interval.