**Examples for Chapter “Simultaneous Inferences”**

**(Math/Stat 286)**

1. The Toluca Company manufactures refrigeration equipment as well as many replacement parts. In the past, one of the replacement parts has been produced periodically in lots of varying sizes. When a cost improvement program was undertaken, company officials wished to determine the optimum lot size for producing this part. The production of this parts involves setting up the production process (which must be done no matter what is the lot size) and machining and assembly operations. One key input for the model to ascertain the optimum lot size was the relationship between lot size and labor hours required to produce the lot. To determine this relationship, data on lot size and work hours for 25 recent production runs were utilized. The production conditions were stable during the six-month period in which the 25 runs were made and were expected to continue to be the same during the next three years, the planning period for which the cost improvement was being conducted. The data is contained in the file called **"Toluca.csv".**
2. Plot the data, do you think the linear model is appropriate for the relationship between the lost size and labor hours?
3. Find the least square regression line.
4. Find the 90% and 95% confidence interval for the slope.
5. Do you think the lot size is positively related to the work hours?
6. Find the 90% confidence interval for the mean work hour when the lot size is 65 units.
7. Find the 90% confidence interval for the mean work hour when the lot size is 100 units.
8. Suppose the next lot to be produced consists of 100 units. Predict the work hours required by providing a 90% confidence interval.
9. What proportion of the variation in work hours has been explained by its relationship to the lot size?
10. Find the 90% joint confidence interval for β0 and β1.
11. Find a family of estimate of the mean number of work hours at the following lot size level: 30, 65, 100 units. The family confidence coefficient is 90%. Use the Working-Hotelling procedure.
12. Use Bonferroni Procedure to get the 90% family confidence intervals.
13. The company wishes to predict the work hours required for each of the next two lots, which will consists of 80 and 100 units. The family confidence coefficient is to be 95%. Get the simultaneous prediction intervals.
14. The Charles Plumbing Supplies Company operates 12 warehouses. In an attempt to tighten procedures for planning and control, a consultant studies the relationship between number of work units performed and total variable labor cost in the warehouses during a test period. The data is given in the file named **"Charles.csv"**.
15. Do you think the regression model through origin is appropriate for the data?
16. Find the regression line that passes the origin.
17. Plot the data, and add the regression line to the scatter plot. What do you think about the model?
18. Find the 95% confidence interval for the slope.
19. Find the 90% confidence interval for the mean cost when the work unit is 100.