

**STATISTICS FOR ENGINEERS
ASSIGNMENT 12
PRACTICE**

This homework assignment deals with problems from all previous chapters. Please make sure you read the questions thoroughly and think about them before you begin your answer. Some of these questions use a real data set; you will need to use a data analysis program. At this point, Excel is still usable. The solutions I will post, however, will use R. Download the data from the web site. The filename is `crime.csv`. When you download the dataset, remember to right click and save it as a `csv` file.

The data come from a 50-state (plus the District) survey of crime rates wealth and education. There are several variables in the data, but the variables of interest are `vcrime90` and `vcrime00` (the violent crime rate in 1990 and in 2000), `pcrime90` and `pcrime00` (the property crime rate in 1990 and 2000), `unemp90` and `unemp00` (unemployment rates in 1990 and 2000), `cultdom` (the dominant political culture in the state), and `census4` (the census region of the United States for that state).

This assignment needs to be typed in a nice format, with a brief discussion for each problem. Each answer should be a paragraph in length (a few sentences) and should specify your null hypothesis, your test(s), the tests statistic(s), the degrees of freedom, and the p-value(s). When you hand in this assignment, attach your work to the back of the typed pages. That way, if your numbers are different from mine, I may be able to determine what you did wrong.

Good luck!

PROBLEM 12.1

Did the violent crime rate in the South change significantly between 1990 and 2000? To determine this, find the means and variances of the violent crime rate in the South for 1990 and 2000. Determine which test should be used. Perform the test. Report your results.

PROBLEM 12.2

Was there a significant relationship between the unemployment rate in 1990 and the violent crime rate in 1990? To determine this, find the means and variances of the two variables. Find the covariance and the correlation between the two variables. Determine if this correlation is significantly different from zero.

PROBLEM 12.3

Which of the three political cultures corresponded to states with the highest property crime rates in 2000? Was this culture significantly larger than either of the other two? To determine this, find the means and variances for each of the three types of political cultures, and perform means tests between each pair of cultures (3 tests altogether). Make the appropriate p-value alteration using Bonferroni's method (as discussed in the book).

PROBLEM 12.4

Oklahoma's property crime rate in 2000 was 4060.8 per 100,000 people. The national average was 3602.84. Was Oklahoma's property crime rate significantly higher than the national average in 2000? What about in 1990?