

STAT 641
Solutions for Assignment # 1

- Problem 1 - (8 Points) Two major problems are
 - Ignoring the launches in which there were no O-ring failures and
 - Extrapolating the data from previous launches in which the temperature was above 50 degrees to a launch in which the temperature would be in the low 30's.
- Problem 2 - (8 Points) One of the most frequent misinterpretations of statistical findings is attributing a "causal" relationship between two events when only a strong correlation exists between the events.
- Problem 3 - (12 Points)

Study 1: Observational, Comparative.

Here the individuals who were prescribed to take aspirin were selected and observed over a period of time. The response variable was non-fatal myocardial infarction or death from coronary heart disease. The explanatory variable was whether someone stopped taking aspirin. Thus the explanatory variable was a categorical yes/no variable.

Study 2: Experimental, Comparative.

The researcher selects two groups of individuals and then applies different treatments to the two groups. The response variable is whether or not a person makes a contribution and the explanatory variable is the method of contact (by telephone or by a personal contact).

Study 3: Observational, Descriptive.

The researcher observes deer in their natural setting.

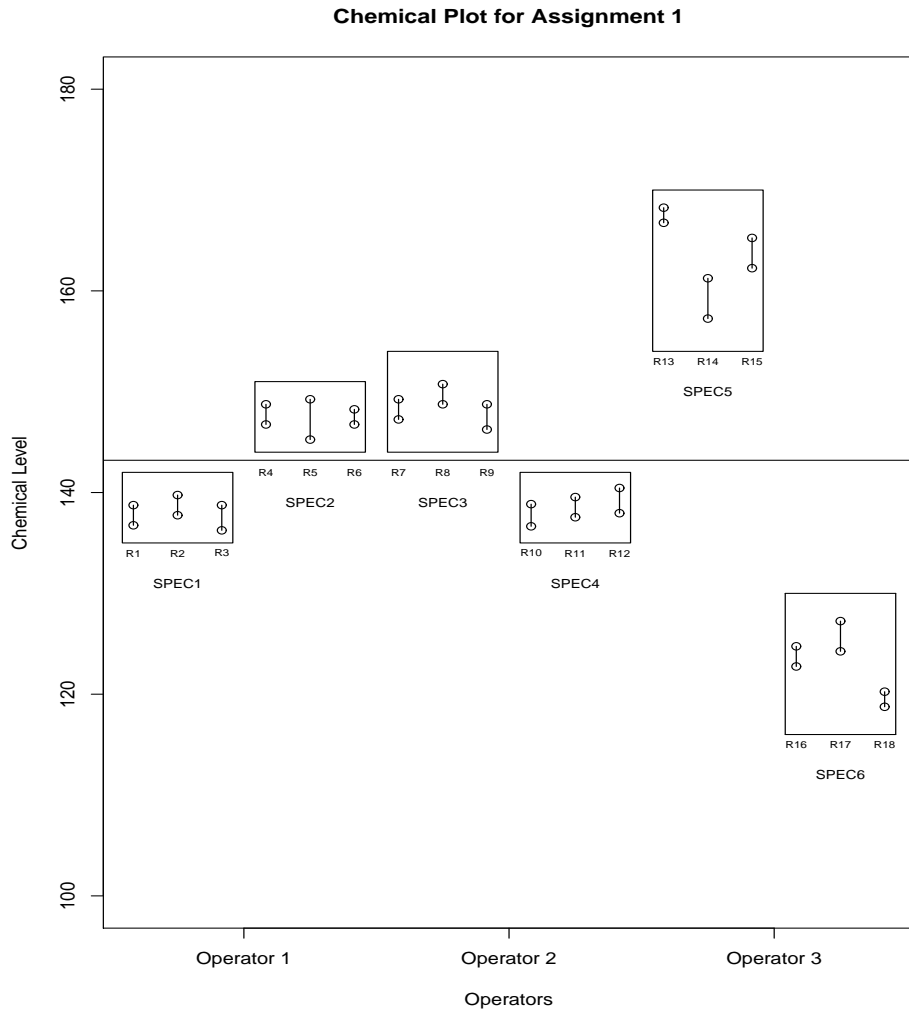
Study 4: Observational, Comparative.

The scientist observes the actions of high school students without applying any treatments. The response variable is whether or not a student is a frequent marijuana smoker and the explanatory variable is whether or not a student is academically successful.

- Problem 4 - (12 Points)
 - (a.) Systematic sampling.
 - (b.) Simple random sampling.
 - (c.) Stratified random sampling with the strata being the voting districts.
 - (d.) Stratified Multi-Stage Cluster sampling. The voting precincts are stratified into one of four regions, and then 10 voting precincts are randomly selected from each of the four regions. The selected precincts consist of clusters of voters and a random sample of 25 voters is selected from each of the selected precincts.
- Problem 5 - (12 Points)
 - (a) Stratified random sampling
The strata are the various job categories.
 - (b) Systematic sampling
Because a sampling unit is a patient arriving at an emergency room facility, the sampling units become available sequentially.
 - (c) Systematic sampling or Simple random sampling
Because a complete alphabetical list of the alumni (a sequential list of sampling units) is available, systematic sampling or simple random sampling can be conducted.
 - (d) Stratified, cluster sampling - Stratified by Type of University (private or public), Cluster of students within each University, then take a SRS from each University or you may want to stratify each university by department then take a SRS within each department.

• Problem 6 - (16 Points)

(a.) See the following plot



(b.) S(O) means show the greatest amount of variability in comparison to the other three sources and the O means have the least amount of variability. In fact, 97% of the overall variability in the 36 response is attributable to S(O); 2.2% of the variability is attributable to R(S,O); 0.5% of the variability is attributable to A(R,S,O); 0.0% of the variability is attributable to O, and .3% of the variability is attributable to all other sources. We will demonstrate how to obtain these percentages in STAT 642.

7. - (8 points) D. The strata are the 5 Regions with a SRS of 10 Power Plants selected in each Region. The Power Plants are clusters with the daily measurements being the units within the clusters.
8. - (8 Points) E. The First Stage Clusters are Counties which are clusters of doctors. The Second Stage Clusters are Doctors with patients being the units within the clusters.
9. - (8 Points) A. The strata are the 35 Regions with a SRS of 15 Pine Trees selected in each Region. The Pine Trees are clusters with the limbs having pine bark beetles being the units within the clusters.
10. - (8 Points) B. The strata are the 25 Costal Counties with a SRS of 50 homes selected in each County.