

HOMEWORK #2

Assigned: 02/08/05

Due: 02/17/05

1. Using EXCEL create one hundred samples of size 4 to simulate data collection from a process that produces welded joints. The joint strength is a normally distributed random variable with a mean of 26 ksi and standard deviation of 3.5. For each sample calculate the sample mean and sample variance.
 - a For each sample use the sample mean to calculate the 95% confidence interval for the true mean using $\sigma_X = 3.5$ ksi. What fraction of the confidence intervals include the true mean of 26 ksi?
 - b For each sample use the sample mean to calculate the 90% confidence interval for the true mean using the sample variance. What fraction of the confidence intervals include the true mean?
 - c For each sample use the sample variance to develop a 99% confidence interval for the true variance. What fraction of the confidence intervals include the true variance?

2. A clinical trial is comparing the effect of a new blood sugar drug (New Drug) against an old drug (Old Drug). 12 patients are selected at random for the trial, and are randomly assigned to receive either the Old or New drug. After using the drug for one month, the blood sugar levels of the patients are tested, producing the following results:

Drug	Blood Sugar Level (milligrams per deciliter)						
Old	70	100	100	135	110	120	100
New	50	95	90	140	120		-

Based on the data in the table, decide whether there is any real difference between the two drugs. Be sure to state all your assumptions.

3. A new airline ticket booking system is being evaluated. It is desired to assess whether the new booking system (BOA) is faster than the old booking system (COBRA). Several employees within a travel agency were asked to work with the two systems. Telephone-based reservation requests to the agency were assigned to one of the systems in an alternating fashion, and the operator handling the request was randomly assigned. The time required to book the reservation was recorded as shown below:

	Processing time (min.)									
BOA	22	24	27	18	21	19	18	17	20	16
COBRA	26	32	31	20	34	36	22	29	27	25

MEEM 5990-DESIGNED EXPERIMENTS

Making whatever assumptions you deem appropriate, analyze the data and draw conclusions. Critique the experiment that was performed. What further experiments and data analysis would you recommend?

4. To determine the effectiveness of an industrial safety program, data were collected before and after the program (held at the very end of 2003). The data is the average weekly loss of person-hours due to accidents in 12 plants.

	Average weekly person-hours lost due to accidents											
Plant	1	2	3	4	5	6	7	8	9	10	11	12
2003	37.1	72.5	26.6	125	45.8	54.3	13.2	79.5	12.6	34.9	39.3	26.6
2004	28.0	59.3	24.7	120	46.2	43.6	15.4	75.1	18.3	29.7	35.0	24.8

Making whatever assumptions you deem appropriate, analyze the data and draw conclusions. Critique the experiment that was performed. What further experiments and data analysis would you recommend?

Graduate Credit

Identify a journal paper that focuses on an experiment that compares two alternatives (two levels for a single variable). Prepare a critical review of the article -- pay special attention to concerns that you have regarding the design of the experiment. Submit your review and a copy of the paper.