Assignment 1

STA6246 - Design and Analysis of Experiments

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Due by Thursday 23rd at 11:59 pm CT

Solve the following problems.

1. Why is randomization important in an experiment? Give an example.
2. Select an experiment of interest to you. State the problem, then select the response variable, and choose the factors, levels, and ranges.
3. Consider the computer output shown below.

One-Sample Z

Test of mu = 30 vs not = 30

The assumed standard deviation = 1.2

N	Mean	SE Mean	95% CI	Z	P
16	31.2000	0.3000	(30.6120, 31.7880)	?	?

   (a) Fill in the missing values in the output. What conclusion would you draw?

   (b) Is this a one-sided or two-sided test?

   (c) Use the output and the normal table to find a 99% Confidence Interval of the population mean.

   (d) What is the P-value if the alternative hypothesis is H_1: $\mu_1 > 30$?

4. The breaking strength of a fiber is required to be at least 150 psi. Past experience has indicated that the standard deviation of breaking strength is $\sigma = 3$ psi. A random sample of four specimens is tested, and the results are $y_1 = 145, y_2 = 153, y_3 = 150, y_4 = 147$.

   (a) State the hypotheses that you think should be tested in this experiment. Test these hypotheses using $\alpha = 0.05$.

   (b) What is the test statistic?

   (c) What are the critical values?

(d) What is the P-value?

(e) What are your conclusions?

(f) Find a 95% Confidence Interval of the population mean breaking strength.