Review

1. In a study of DDT poisoning, researchers fed several rats a measured amount of DDT. They then made measurements on the rats' nervous systems that might explain how DDT poisoning causes tremors. One important variable was the "absolutely refractory period," the time required for a nerve to recover after a stimulus. This period varies normally. Measurements on five rats gave the data below (in milliseconds).

   1.4 1.6 1.7 1.8 2.0

   a) Find a 90% confidence interval for the absolutely refractory period for all rats of this strain when subjected to the same treatment.
   b) Suppose that the mean absolutely refractory period for unpoisoned rats is known to be 1.4 milliseconds. DDT poisoning should slow nerve recovery and so **increase this period**. Do the data from five rats above give good evidence for this supposition? State H_0 and H_a and perform a hypothesis test at $\alpha = 0.05$ level of significance. Also, estimate the p-value for this one-sided test.

2. In a study of specifically language-impaired (SLI) children, the data on deviation intelligence quotient (DIQ) for a random sample of SLI children and another random sample of younger normally developing (YSD) children are reproduced in the table below. Data are both normally distributed with almost equal variances. At 5% level of significance, test whether the mean DIQ of the two groups of children are significantly different. Also, estimate the p-value for this two-sided test.

SLI Children	88	89	84	81	94	99	101	105
YND Children	88	92	95	91	90	97	100	110

3. In a survey at Youngstown City, one question asked the total 1997 income of the householder for estimating the average householder's income. (The householder is the person in whose name the dwelling unit is owned or rented.) A pilot study indicated that the standard deviation of income is $7000. How large a sample of households would enable you to estimate the mean income of Youngstown householders within a margin of error of $1000 with 95% confidence?

4. Response to an advertising display was measured by counting the number of people who purchased the product out of the total number exposed to the display. If 250 purchased the product out of a total of 1000 exposed, estimate the proportion of all persons exposed who will buy the product. Use a 95% confidence interval.

5. A research paper by Squires et al. (1978) assessed the acute effects of alcohol on auditory brainstem potentials in humans. Six volunteers participated in the study. The latency (delay) in response to an auditory stimulus was measured before and after an intoxicating dose of alcohol. The measurements of the latency of peak responses (in milliseconds after the stimulus onset) in the six subjects were as follows:

Latency of Peak						
Treatment \ Individual's ID	**1**	**2**	**3**	**4**	**5**	**6**
Before alcohol	3.85	3.81	3.60	3.68	3.78	3.83
After alcohol	3.82	3.95	3.80	3.87	3.88	3.94

   Use a paired-sample *t*-test to test the significance of the **difference** at the $\alpha = 0.05$. Also, state the assumption that is needed for using the test procedure. Also, estimate the p-value for this two-sided test.

6. Shopping at secondhand stores is becoming more popular and has even attracted the attention of business schools. A study of customers' attitudes toward secondhand stores interviewed samples of shoppers at two secondhand stores of the same chain in two cities of different sizes. The breakdown of the respondents by sex is as follows

	Large City	Small City
Men	40	90
Women	210	130

   Use the χ^2 test to see whether there is a significant relation between the gender distribution of customers and the size of city? Also, estimate the p-value for this test.