

**A.P. Statistics**  
**Assignment 8.3**

**Remember to show your thinking through your work.**

- 1) What are the conditions for working with  $t$  (with regards to confidence intervals and testing)?

- 2) National Fuelsaver Corporation manufactures the Platinum Gasaver, a device they claim "may increase gas mileage by 22%." Here are the percent changes in gas mileage for 15 identical vehicles, as presented in one of the company's advertisements:

48.3 46.9 46.8 44.6 40.2 38.5 34.6 33.7  
28.7 28.7 24.8 10.8 10.4 6.9 -12.4

Would you recommend use of a  $t$  confidence interval to estimate the mean fuel savings in the population of all such vehicles? Explain your answer.

- 3) The scores of four roommates on the Law School Admission Test (LSAT) are

628 593 455 503

Find the mean, the standard deviation, and the standard error of the mean. Is it appropriate to calculate a confidence interval for these data? Explain why or why not.

- 4) A bank wonders whether omitting the annual credit card fee for customers who charge at least \$2400 in a year would increase the amount charged on its credit card. The bank makes this offer to an SRS of 250 of its existing credit card customers. It then compares how much these customers charge this year with the amount that they charged last year. The mean increase is \$342, and the standard deviation is \$108.

- (a) Is there significant evidence at the 1% level that the mean amount charged increases under the no-fee offer? State  $H_0$  and  $H_a$  and carry out a  $t$ -test.

- (b) Give a 95% confidence interval for the mean amount of the increase.

- (c) The distribution of the amount charged is skewed to the right, but outliers are prevented by the credit limit that the bank enforces on each card. Use of the  $t$  procedures is justified in this case even though the population distribution is not normal. Explain why.

- 5) The Acculturation Rating Scale for Mexican Americans (ARSMA) measures the extent to which Mexican Americans have adopted Anglo/English culture. During the development of ARSMA, the test was given to a group of 17 Mexicans. Their scores, from a possible range of 1.00 to 5.00, had  $\bar{x} = 1.67$  and  $s = 0.25$ . Because low scores should indicate a Mexican cultural orientation, these results helped to establish the validity of the test.

- (a) Give a 95% confidence interval for the mean ARSMA score of Mexicans.

- (b) What assumptions does your confidence interval require? Which of these assumptions is most important in this case?