

Full Detail: Work out the following problems. **Show your work. No partial credit will be given without work shown, even if the answer is correct.**

1. An automobile manufacturer recommends oil change intervals of 3,000 miles. To compare actual intervals to the recommendation, the company randomly samples records of 50 oil changes at service facilities and obtains sample mean 3,752 miles, with a standard deviation 638 miles. Determine whether the data provide sufficient evidence, at the 5% level of significance, that the population mean interval between oil changes exceeds 3,000 miles.
 - a) State the null and alternative hypothesis. Also denote the claim.
 - b) Calculate **and** interpret the test-statistic, Draw a graph to support your work. Interpret the test statistic.
 - c) State the decision and your conclusion in terms of the problem. Assume $\alpha = 0.05$.
 - d) What type of error could you have made? Interpret that error.
- d) Is it appropriate to construct a confidence interval to test the claim? Explain why or why not.

2. In a sample of 47 adults selected randomly from one town, it is found that 9 of them have been exposed to a particular strain of the flu. Test the claim that the proportion of all adults in the town that have been exposed to this strain of the flu is 8%.
- a) State null and alternative hypothesis. Also denote the claim.
 - b) Calculate the test-statistic and sketch a graph to support your work. Calculate and interpret the p-value.
 - c) State your decision and conclusion in terms of the problem. Assume $\alpha = 0.05$.
 - d) Construct a 90% confidence interval. Does the interval support your conclusion in part (c)? Explain.
 - e) What are the assumptions for the test?