

STAT 345 - Summer, 2006: Quiz 11 (take home)

BASED ON SECTIONS: 8.2, 8.3, 9.1–9.3

For this assignment you may use Minitab, another software program, or you may do it by hand.

In Minitab, z-tests, t-tests and confidence intervals can be performed by selecting *Stat* → *Basis Statistics* → *1 sample t..* or *1 sample Z...* Note that z-tests are large sample procedures (using $z_{\frac{\alpha}{2}}$) and t-tests are small sample procedures (using $t_{\frac{\alpha}{2}}$). In Minitab, enter the null hypothesis mean under *Test mean:*. Select *Options...* to do a one-sided test or change the confidence level.

1. Refer to the third problem on Quiz 10 which gave the body temperatures for 25 female subjects.
 - (a) Construct a 95% confidence interval for the true mean female body temperature.
 - (b) Test the hypotheses $H_0 : \mu = 98.6$ versus $H_1 : \mu \neq 98.6$, using $\alpha = 0.05$. Find the P-value.
 - (c) Explain how parts (a) and (b) are related?
 - (d) What assumptions did you make to carry out these procedures?

2. Refer to the cloud seeding data from Quiz 10.
 - (a) Construct a 99% confidence interval for the true mean rainfall from seeded clouds.
 - (b) Can you support a claim that mean rainfall from seeded clouds exceeds 25 acre-feet? Use $\alpha = 0.01$. Carefully state the hypotheses. Calculate the test statistic. Report a p-value and give your conclusions. State any assumptions necessary to perform the test.

3. Recall from the FIRST day of class that the FDA sets limits for DDT content in fish at 5 parts per million (ppm). Fish with DDT content exceeding this limit are considered potentially hazardous if consumed. In the summer of 1980 the U.S. Army Corps of Engineers collected fish specimens at different locations along the Tennessee River downstream from an inactive manufacturing plant to determine if discharged toxic material contaminated the fish. 144 fish were captured and the DDT concentration (in ppm) was measured in each fish. The data are given on the course web page.

Is a massive cleanup of the Tennessee River in order? Would you consume any fish caught in the Tennessee? Does the mean DDT concentration of fish in the Tennessee River downstream from the manufacturing plant exceed FDA standards? Set up and carry out the appropriate hypothesis test. Carefully state the hypotheses. Calculate the test statistic. Report a p-value and give your conclusions. State any assumptions necessary to perform the test. Provide plots and discuss whether or not the assumptions are met.