

Statistics
Assignment #10

Due: Dec.22.2016

1. The manager of a service station is in the process of analyzing the number of times car owners change the oil in their cars. She believes that the average motorist changes his or her car's oil less frequently than recommended by the owner's manual (two times per year). In a preliminary survey she asked 14 car owners how many times they changed their cars' oil in the last 12 months. The results are 1, 1, 2, 0, 3, 3, 0, 1, 0, 1, 2, 3, 3, and 1.
 - (a) Does this data provide sufficient evidence at the 10% significance level to indicate that the manager is correct?
 - (b) What condition is required in order to analyze this data using a t -test?
2. A random sample of 7 observations was drawn from a normal population. The following summations were computed: $\sum x_i = 63.5$ and $\sum x_i^2 = 580.2$. Test the hypothesis $H_0 : \mu = 8$ vs. $H_1 : \mu > 8$ at the 1% significance level.
3. A life insurance representative believes that the mean age of people who buy their first life insurance plan is less than 35. To test his belief he takes a random sample of 15 customers who have just purchased their first life insurance. Their ages are 42, 43, 28, 34, 30, 36, 25, 29, 32, 33, 27, 30, 22, 37, and 40. There is not enough evidence to say the data are nonnormal. Can we conclude at the 1% significance level that the insurance representative is correct?
4. During a water shortage, a water company randomly sampled residential water meters in order to monitor daily water consumption. On a particular day, a sample of 100 meters showed a sample mean of 250 gallons and a sample standard deviation of 50 gallons. Provide a 90% confidence interval estimate of the mean water consumption for the population.
5. A drug company has just developed a new pill to alleviate the symptoms of allergies and colds. However, they are concerned about the variability in the amount of time until the drug becomes effective. In a random sample of 10 individuals who suffer from allergies, the amount of time (in hours) for the pill to take effect was recorded and listed as follows: 5, 7, 6, 10, 9, 12, 8, 17, 4, and 16. Estimate with 90% confidence the variance of the time for the drug to become effective.
6. The grades of a sample of 10 students, selected at random from a large population, are 71, 86, 75, 63, 92, 70, 81, 59, 80, and 90. Construct a 90% confidence interval estimate for the population standard deviation.

7. The marketing manager of a large multinational corporation is concerned that some salespersons perform very well and others quite poorly. To help analyze the problem he draws a random sample of 20 salespersons, determines their commission incomes (in thousands of dollars), and calculates the following statistics: $\bar{x} = \$37.2$, and $s = \$7.8$. Do these statistics provide sufficient evidence at the 5% significance level to conclude that the population variance exceeds \$35 million²?
8. One important factor in inventory control is the variance of the daily demand for the product. A management scientist has developed the optimal order quantity and recorder point, assuming that the variance is equal to 250. Recently, the company has experienced some inventory problems, which induced the operations manager to doubt the assumption. To examine the problem, the manager took a sample of 25 days and recorded the demand.

188	212	176	213	182	203	185	214	213	209
199	229	217	183	205	159	208	189	203	220
198	224	194	213	204					

- (a) Do these data provide sufficient evidence at the 5% significance level to infer that the management scientist's assumption about the variance is wrong?
- (b) What is the required condition for the statistical procedure in Part a?