Problem Set for Chapter 11: Introduction to Hypothesis Testing
Eco249 Statistics   Queens College   K. Matsuda

Excel Assignments (You need to hand in these.)

[11.1](8 points)
Calculate the sample mean using Excel's 'Descriptive Statistics' and then manually calculate the test statistic.

> The 1996-1997 room and board costs for a sample of 20 American universities and colleges are listed in the file "room and board costs". Test the hypothesis that the true mean room and board costs of all American colleges and universities differ from $6,000. Use 5% level of significance. Give me your opinion.

Exercises for Your Better Understanding (You don't have to hand in these.)

Example 11.1 on page 323 (Solution is on page 323-327 of the textbook.)
The manager of a department store is thinking about establishing a new billing system for the store's credit customers. After a though financial analysis, she determines that the new system will be cost effective only if the mean monthly account is more than $170. A random sample of 400 monthly accounts is drawn, for which the sample mean is $178. The manager knows that the accounts are approximately normally distributed with a standard deviation of $65. Can the manager conclude from this that the new system will be cost effective?

Question on page 319 (Solution is on page 333 of the textbook.)
Federal Express (FedEx) sends invoices to customers requesting payment within 30 days. The bill lists an address, and customers are expected to use their own envelops to return their payments. Currently the mean and standard deviation of the amount of time taken to pay bills are 24 days and 6 days, respectively. The chief financial officer (CFO) believes that including a stamped self-addressed (SSA) envelope would decrease the amount of time. She calculates that the improved cash flow from a 2-day decrease in the payment period would pay for the costs of envelops and stamps. Any further decrease in the payment period would generate a profit. To test her belief, she randomly selects 220 customers and includes a stamped self-addressed envelope with their invoices. The number of days until payment is received are stored in file Ch11:\SSA. The data produced $\bar{x} = 21.63$. Can the CFO conclude that the plan will be profitable?

Example 11.2 on page 334 (Solution is on page 335 of the textbook.)
In recent years, a number of companies have been formed that offer competition to AT&T in long-distance calls. All advertise that their rates are lower than AT&T's, and as a result their bills will be lower. AT&T has responded by arguing that for the average consumer there will be no difference in billing. Suppose that a statistics practitioner working for AT&T determines that the mean and the standard deviation of monthly long-distance bills for all its residential customers are $17.09 and $3.87, respectively. He then takes a random sample of 100 customers and recalculates their last month's bill using the rates quoted by a leading competitor. These data are stored in file Xm 11-02. The data produced $\bar{x} = 17.55$. Assuming that the standard deviation of this population is the same as for AT&T, can we conclude at the 5% significance level that there is a difference between AT&T's bills and those of the leading competitor?

Example: Wedding (This question will be treated in class.)
More people are choosing to get married in the Caribbean as the cost of traditional wedding increases. In fact, weddings in the Caribbean, with the cost of travel, can cost the bride's father between $5,000 and $10,000. As an additional benefit, the wedding can roll right into the honeymoon. While the disadvantage of such far-away weddings is difficult for many relatives and close friends, the savings over a $25,000 to $30,000 traditional wedding can make the decision easy. Suppose that a Caribbean resort wished to promote its location as a low-cost alternative to the traditional wedding and advertised that the average wedding with travel expenses is $7,500 and standard deviation is $1,096. To confirm this figure, 50 previously held weddings on the Caribbean island are randomly sampled. The data produced the mean $7712. Using a 0.05 significance level, is there sufficient evidence to indicate that the average cost of a wedding in the Caribbean is greater than $7,500?

Example: Smoking (This question will be treated in class.)
The current no-smoking regulations in office buildings require workers who smoke to take breaks and leave the building in order to satisfy their habits. A study indicates that such workers average 32 minutes per day taking smoking breaks. The standard deviation is 6 minutes. To help reduce the average, break rooms with powerful exhausts were installed in the buildings. To see whether these rooms serve their designated purpose, a random sample of 110 smokers was taken. The total amount of time away from their desks was measured for one day. The sample mean was calculated to be 29.918. Test to determine whether there has been a decrease in the mean time away from their desks. Use 5% level of significance.

Example: Kleenex (This question will be treated in class.)
How do the makers of Kleenex know how many tissues to put in a box? *The Wall Street Journal* (Sept. 21, 1984) reported that the marketing experts at Kimberly-Clark Corporation have "little doubt that the company should put 60 tissues in each pack." The researchers claimed that 60 is "the average number of times people blow their nose during a cold" by asking hundreds of customers to keep count of their Kleenex use in diaries. Suppose a random sample of 250 Kleenex users yielded the sample mean number of times they blew their nose when they had a cold to be 57. Population standard deviation is somehow known to be 26. Test whether the average number of times people blow their nose during a cold is different from 60 at 5% significance level.

For further exercises refer to Chapter 11 of the textbook.