**CBA: Practice Problem Set 7**

**Topics: 2 sample tests**

1) Insurance adjusters investigate the relative automobile repair costs at 2 garages. Each of 15 cars recently involved in accidents is taken to both garages 1 and 2 for separate estimates of repair costs. Below table indicates the mean and standard deviation of repair costs (in thousands of rupees) at each of the 2 garages.

|  |  |  |
| --- | --- | --- |
|  | **Garage 1** | **Garage 2** |
| **Mean** | 7.68 | 6.64 |

The standard deviation of differences is 2.92.

If the maximum probability of type I error is set at 0.05, can you conclude beyond reasonable doubt that the 1st garage is charging a higher price to its customers?

2) A manufacturer of modems uses microcomputer chips from two different sources. As part of quality-control testing, the manufacturer obtains data on the rate of defective chips per thousand for each lot of chips. Study the results given below:

|  |  |  |
| --- | --- | --- |
|  | Source I | Source II |
| Mean | 13.43 | 15.21 |
| Variance | 32.92 | 38.12 |
| Observations | 10 | 10 |
| Pooled variance | 35.52 |  |

What is the probability of type I error the manufacturer will commit to, if he concludes that the rate of defective chips from both these lots is unequal?

3) A marketing team designed a promotional web page to increase online sales. In order to test the effectiveness of the new page, visitors to the company’s website were randomly directed to the old page or the new page. Of the 300 visitors to the website on a particular day, the 169 visitors who were directed to the old page spend $253 on average (with standard deviation $130). The remaining visitors who were directed to the new page spent $328 on average (with standard deviation $161). Does the new page generate statistically significantly higher sales than the old page? State the null hypothesis and whether it’s rejected. (Assume that these samples are large enough to satisfy the sample size condition and they both population have equal variances.)

4) Many advocates for daylight savings\* claim that it saves money by reducing energy consumption. Generally it would be hard to run an experiment to test this claim, but as fortune would have it, counties in state X provided an opportunity. Until 2008, only 15 of the 92 counties in state X used daylight savings time. The rest had remained on Standard time. Now all are on daylight savings time. The local energy provider has access to utility records in counties that recently moved to daylight savings and counties that did not.

Suppose we have data for 25 counties which have shifted to daylight savings time and 36 which haven’t. The average monthly electricity consumption of the first set of counties was 1000 kilowatthours (kWh) with a standard deviation of 250. For those counties which haven’t shifted to daylight savings, the average consumption was 1350 kWh with standard deviation of 280. Test for whether this evidence is strong enough to suggest that daylight savings time really reduces energy consumption. Assume that they both population have equal variances.

**\*Daylight Saving Time** (DST) is the practice of turning the clock ahead as warmer weather approaches and back as it becomes colder again so that people will have one more hour of daylight in the afternoon and evening during the warmer season of the year.

Taken from <http://whatis.techtarget.com/definition/Daylight-Saving-Time-DST>