**Assignment – Ch 9,10,12,13**

1. A supermarket manager is keeping track of the arrival of customers at checkout counters to see how many cashiers are needed to handle the flow. In a sample of 500 five-minute time periods, there were 22,74,115,95,94,80 and 20 periods in which 0,1,2,3,4,5,6 or more customers, respectively, arrived at a check-out counter. Are these data consistent at the 0.05 level of significance with a Poisson distribution?
2. In comparing two medical treatments for a disease, the null hypothesis is that the two treatments are equally effective. Why does making a Type I error not matter? What significance level for the test should be set as a result?
3. A new manager in a store is interested in the percentage of customers who are totally satisfied with the store. The previous manager had 86% of the customers totally satisfied. The new manager claims that the same is true today. He sampled 187 customers and found 157 were totally satisfied. At 1% significance level, is there evidence that the new manger’s claim is valid?
4. Two political parties are debating crime figures. One party says that crime has increased compared to the previous year. The other party says it has not.
   1. Write down the null and alternative hypotheses.
   2. Explain the Type I and Type II error that could be made in this example and the possible costs of each type of error.
5. What are the assumptions that we make for Analysis of Variance?
6. A press company hypothesizes that the average life of its largest web press is 14,500 hours. The know the standard deviation of press life is 2,100 hours. From a sample of 25 presses, the company finds a sample mean of 13,000 hours. At a 0.01 significance level, should the company conclude that the average life of the presses is less than the hypothesized 14,500 hours? (Hint: p-value = 0)
7. Explain randomized block design.
8. A real estate agent took a random sample of 12 homes and found the market value to be 780,000 and the standard deviation was 49,000. Test the hypothesis that the mean appraised value is 825,000 against the alternative that it is less than 825,000. Use α = 0.05 (Hint: t = -3.181)
9. A production line operation is tested for filling weight accuracy using the following hypotheses

|  |  |
| --- | --- |
| **Hypothesis** | **Conclusion and action** |
|  | Filling okay; keep running |
|  | Filling off standard; stop and adjust machine |

The sample size is 30 and the population standard deviation is σ = 0.08 Use α = 0.05

* 1. What would a Type II error mean in this situation?
  2. What is the probability of making a Type II error when the machine is overfilling by 0.5 ounces?
  3. What is the power of the statistical test when the machine is overfilling by 0.5 ounces?

1. Under what conditions is it appropriate to use a one-tailed test or two-tailed test? If you have decided that a one-tailed test is appropriate test to use, how do you decide whether it should be a lower-tailed test or upper-tailed test?
2. An agricultural extension service wishes to determine whether a new hybrid seed corn has a greater yield than an old standard variety. The service asks 10 farmers to record the yield of an acre planted with the new variety and asks another 10 farmers to record the yield of an acre planted with the old variety. This sampling procedure can be said to be Independent sample design or Matched Sample Design? What change will you make in the sampling procedure to change the sampling design?
3. In a trial, the null hypothesis is that an individual is innocent of a certain crime. Would the legal system prefer to commit Type I or a Type II error with this hypothesis?
4. Two different areas of a large eastern city are being considered as sites for day-care centres. Of 200 households surveyed in one section, 52% mothers worked full-time. In another section, 40% of the 150 households surveyed had mothers working at full-time job. At 0.05 level of significance, is there any significant difference in the working mothers in the two areas of the city?
5. Explain Chi-square test. Explain the uses or applications of Chi-square test.
6. 15.1% people will catch a cold once another family member contracts a cold. A nasal spray was tested on 180 people, one of whose family members subsequently contracted cold. Only 17 of the test subjects developed similar cold. At α = 0.05, should it be concluded that the new spray effectively reduces transmission of cold? (Hint: p-value = 0.0174)
7. To see whether chips sales are independent of the economy, data collected on the sales is as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| **Economy | Sales** | **High** | **Medium** | **Low** |
| **At Peak** | 20 | 7 | 3 |
| **At Trough** | 30 | 40 | 30 |
| **Rising** | 20 | 8 | 2 |
| **Falling** | 30 | 5 | 5 |

At 0.10 significance level, what is your conclusion?

1. Two research laboratories have independently produced drugs that provide relief to arthritis sufferers. The first drug was tested on a group of 90 arthritis sufferers and produced the mean of 8.5 hours of relief and the standard deviation 1.8 hours. The second drug was tested on 80 arthritis sufferers and produced the mean of 7.9 hours of relief and the standard deviation 2.1 hours. At 0.05 level of significance, does the second drug provide a significantly shorter period of relief? (Hint: p-value = 0.0233)
2. General Electric has developed a new bulb whose design specifications call for a light output of 960 lumens compared to an earlier model that produced only 750 lumens. The company’s data indicate that the standard deviation of light output for this type of bulb is 18.4 lumens. From a sample of 20 new light bulbs, the testing committee found an average light output of 954 lumens per bulb. At a 0.05 significance level, can General Electric conclude that its new bulb is producing the specified 960 lumens output? (Hint: p-value = 0.1442)
3. Explain power of the test and the power curve.
4. Three training methods were compared to see whether they led to greater productivity after training. The following are productivity measures for individual trained by each method

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Method 1** | 45 | 40 | 50 | 39 | 53 | 44 |
| **Method 2** | 59 | 43 | 47 | 51 | 39 | 49 |
| **Method 3** | 41 | 37 | 43 | 40 | 52 | 37 |

At 0.05 level of significance, do the three training methods lead to different levels of productivity?