SLIIT UNI
THE KNOWLEDGE UNIVERSITY

IT2120 - Probability and Statistics

Department of Information Technology, Faculty of Computing

Year 2 semester 1 (2025)

Tutorial 07

1. The production manager at a mobile phone battery factory needs to estimate the mean lifetime of his mobile phone batteries. The population standard deviation is known to be 100hours and lifetimes of these batteries are normally distributed. A random sample of 81 batteries is taken from production, and its mean is found to be 550hours. Test at 95% confidence the manager's claim that the mean lifetime of the mobile phone batteries is 570 hours.

2. Explain what is meant by type I and type II errors in hypothesis testing.

3. The college bookstore tells prospective students that the average cost of its textbooks is LKR 520 with a standard deviation of LKR 45. A group of smart statistics students thinks that the average cost is higher. To test the bookstore's claim against their alternative, the students selected a random sample of size 100. The mean from their random sample is LKR 528. Perform a hypothesis test at the 5% level of significance and state your decision.

4. It is claimed that sports-car owners drive on average 18,000 miles per year. A consumer firm believes that the average mileage is probably lower. To check, the consumer firm obtained information from 40 randomly selected sports-car owners that resulted in a sample mean of 17,463 miles with a sample standard deviation of 1348 miles. What can we conclude about this claim?

5. A random sample of 8 cigarettes of a certain brand has an average tar content of 18.6 mg and standard deviation of 2.4 mg. Is this align with the manufacturer's claim that the average tar content does not exceed 17.5 mg? Use the 0.01 level of significance.

6. Farm and power equipment dealers are typically dependent on a primary supplier organization for many of their business needs. These suppliers often demand control over many of the dealers' decisions. To determine the degree to which dealers are dependent on suppliers, a survey of 12 farm and power equipment dealers was conducted. The study revealed the following data on the total number of suppliers engaged by the dealers:
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   i. Find the mean and the standard deviation of the above data.

   ii. Test the hypothesis that the true mean number of suppliers engaged by farm and power equipment dealers exceeds 3.2, using 0.05 significance level.