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IT2120 - Probability and Statistics

Department of Information Technology, Faculty of Computing

Year 2 semester 1 (2025)

Tutorial 08

1. A sample of size $n = 81$ produced the sample mean of $\bar{X} = 12$. Assuming the population standard deviation $\sigma = 3$, compute a 95% confidence interval for the population mean μ.

2. Assuming the population standard deviation $\sigma = 3$, how large should a sample be to estimate the population mean μ with a margin of error not exceeding 0.5?

3. The operations manager of a large production plant would like to estimate the mean amount of time a worker takes to assemble a new electronic component. Assume that the standard deviation of this assembly time is 3.6 minutes. After observing 120 workers assembling similar devices, the manager noticed that their average time was 16.2 minutes. Construct a 92% confidence interval for the true mean assembly time.

4. In order to ensure efficient usage of a server, it is necessary to estimate the mean number of concurrent users. According to records, the sample mean and sample standard deviation of number of concurrent users at 100 randomly selected times is 37.7 and 9.2, respectively.

   (a) Construct a 90% confidence interval for the true mean number of concurrent users.

   (b) Do these data provide significant evidence, at 10% significance level, that the true mean number of concurrent users is equal to 35?

5. To assess the accuracy of a laboratory scale, a standard weight that is known to weigh 1 gram is repeatedly weighed 4 times. The resulting measurements (in grams) are: 0.95, 1.02, 1.01, 0.98. Assume that the weighing by the scale when the true weight is 1 gram has mean μ.

   (a) Use these data to compute a 95% confidence interval for μ..

   (b) Do these data give evidence at 5% significance level that the scale is not accurate? Answer this question by performing an appropriate test of hypothesis.

6. Installation of certain hardware takes a random amount of time with a standard deviation of 5 minutes. A computer technician installs this hardware on 64 different computers, with the average installation time of 42 minutes. Compute a 95% confidence interval for the true mean installation time.