

# Qnt 561 week2 assignment



**ASSIGN  
BUSTER**

Central Limit Theorem and Confidence Intervals Problem Sets Tiffany Blount

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Limit Theorem and Confidence Intervals Problem Sets Chapter 8 Exercises:

21. What is sampling error? Could the value of the sampling error be zero? If it were zero, what would this mean? \* Sampling error is the difference between the statistic estimated from a sample and the true population statistic. It is not impossible for the sampling error to not be zero. If the sampling error is zero then the population is uniform.

For example if I were evaluating the ethnicities of a populations and everyone is the population was Black then taking any sample would give me the true proportion of 100% Black. 22. List the reasons for sampling. Give an example of each reason for sampling. \* The population size is too large and costly for making the study feasible in reasonable period. For example, if I want to know how watching the violent shows on television affects the behavior of children, it won't be realistic to study each child in the population, so I would use sampling. \* Only estimation of particular section of population is required

For example, if I want to take an example of nation which is combined unit of states. I can choose the random samples of states which can be further divided into smaller units like cities. These cities can be clustered into smaller areas for observation. Researchers can define his pattern of selecting the sample data until data condition of observation is fully satisfied. \* It is not possible to study the entire population and accessibility of them is time consuming and difficult For Example, if I wanted to prepare a list of all the customers from a chain of hardware stores. This would be a tedious task.

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But it is convenient to choose a subset of stores in stage one of cluster sampling which can be used for interviewing the customers from those stores in the second stage of cluster sampling. 34. Information from the American Institute of Insurance indicates the mean amount of life insurance per household in the United States is \$110,000. This distribution follows the normal distribution with a standard deviation of \$40,000. A. If we select a random sample of 50 households, what is the standard error of the mean? \*

Standard error of the sample mean =  $\sigma/\sqrt{n} = 40000/\sqrt{50} = 5656.85$

B. What is the expected shape of the distribution of the sample mean? \*

Since sample size is greater than 50, it should be normally distributed

according to the Central Limit Theorem. C. What is the likelihood of selecting

a sample with a mean of at least \$112,000? \*  $z = (X - \mu) / \sigma/\sqrt{n}$ , Where X is a

normal random variable,  $\mu$  is the mean, and  $\sigma$  is the standard deviation.  $P(X >$

$112000) = P(z > (112000 - 110000)/5656.85) = P(z > 0.3535) = 0.5 - P(0 <$

$z < 0.3535) = 0.5 - 0.1368 = 0.3632$ . D. What is the likelihood of selecting a

sample with a mean of more than \$100,000?  $P(X > 100000) = P(z > (100000$

$- 110000)/5656.85) = P(z > -1.7677) = 0.5 + P(-1.7677 < z < 0) = 0.5 + P$

$(0 < z < 1.7677) = 0.5 + 0.4616 = 0.9616$ . E. Find the likelihood of selecting

a sample with a mean of more than \$100,000 but less than \$112,000. \*  $P$

$(100000 < X < 112000) = P(X < 112000) - P(X < 100000) = 0.9616 - 0.3632 =$

$0.5984$ . Chapter 9 Exercises 32. A state meat inspector in Iowa has been

given the assignment of estimating the mean net weight of packages of

ground chuck labeled "3 pounds." Of course, he realizes that the weights

cannot be precisely 3 pounds.

A sample of 36 packages reveals the mean weight to be 3.01 pounds, with a standard deviation of 0.03 pounds. a. What is the estimated population mean? \* 3.01. b. Determine a 95 percent confidence interval for the population mean. \*  $3.01 \pm 1.96 * 0.03 / \sqrt{36} = 3.0002, 3.0198$

34. A recent survey of 50 executives who were laid off from their previous position revealed it took a mean of 26 weeks for them to find another position. The standard deviation of the sample was 6.2 weeks. Construct a 95 percent confidence interval for the population mean.

Is it reasonable that the population mean is 28 weeks? Justify your answer.  $z = 1.96$  (from a table)  $N = 50$   $sd = 6.2$   $mean = 26$  \*  $26 - 1.96 * 6.2 / \sqrt{50}$  to  $26 + 1.96 * 6.2 / \sqrt{50} = 24.281$  to  $27.719$ ; The value of 28 weeks is not inside that confidence interval, so it is not reasonable that the population mean is 28 weeks.

46. As a condition of employment, Fashion Industries applicants must pass a drug test. Of the last 220 applicants 14 failed the test. Develop a 99 percent confidence interval for the proportion of applicants that fail the test.

Would it be reasonable to conclude that more than 10 percent of the applicants are now failing the test? In addition to the testing of applicants, Fashion Industries randomly tests its employees throughout the year. Last year in the 400 random tests conducted, 14 employees failed the test. Would it be reasonable to conclude that less than 5 percent of the employees are not able to pass the random drug test? 1st:  $z = 2.5758$   $p = 14/220$   $p - z * \sqrt{p * (1-p) / N}$  to  $p + z * \sqrt{p * (1-p) / N}$   $14/220 - 2.5758 * \sqrt{14/220 * (1 - 14/220) / 220}$  to  $14/220 + 2.5758 * \sqrt{14/220 * (1 - 14/220) / 220}$  \* 0.212 to 0.1060; 10% is within that interval, so yes, it is reasonable 2nd:  $z = 2.5758$   $p$

$= 14/400 \pm z \cdot \sqrt{p(1-p)/N}$  to  $p + z \cdot \sqrt{p(1-p)/N}$   $14/400 \pm 2 \cdot$

$5758 \cdot \sqrt{(14/400)(1-14/400)/400}$  to  $14/220 + 2 \cdot 5758 \cdot \sqrt{(14/400)(1-$

$14/400)/400) \cdot 0.01133$  to  $0.05866899$ ; No, it's not reasonable to assume that less than 5% fail the test, since the interval goes higher than 5%.

Discussion Question 5 Chapter 3 5. You have been approached by the editor of Gentlemen's Magazine to carry out a research study. The magazine has been unsuccessful in attracting shoe manufacturers as advertisers.

When the sales force tried to secure advertising from shoe manufacturers, they were told men's clothing stores are a small and dying segment of their business. Since Gentlemen's Magazine goes chiefly to men's clothing stores, the manufacturers reasoned that it was, therefore, not a good vehicle for their advertising. The editor believes that a survey (via mail questionnaire) of men's clothing stores in the United States will probably show that these stores are important outlets for men's shoes, and are not declining in importance as shoe outlets. He asks you to develop a proposal for the study and submit it to him.

Develop the management-research question hierarchy that will help you to develop a scientific proposal. \* 1st determine our management dilemma.

How can we get shoe manufacturers to purchase advertising from

Gentlemen's Magazine? \* 2nd determine the management questions. Do

men's clothing stores provide an important outlet for men's shoes? Do shoe manufacturers provide a profitable sales source? \* 3rd determine the

research questions. What volume of sales does men's shoes provide to

men's clothing stores? What profits do men's shoe manufacturers provide to Gentlemen's Magazine?