

Lesson 7 Introduction to Statistics

ELEMENTARY PROBLEMS

For a given Mean 494 and standard deviation = 100

1. What is the probability that a randomly selected score is between 600 and its mean.
2. What is the probability of obtaining a score more than 700.
3. Score that is less than 550.
4. Score between 300 and 600.

Suppose during any hour in large departmental store, the average number of shoppers is 448, with the standard deviation of 21 shoppers. What is the probability that a random sample of 49 different shopping hours will yield a sample mean between 441 and 446 shoppers.

Mercury makes a 2.4 lt V-6 engine, The Laser XRi, used in speedboats. The companies engineer believe that the engine delivers an average power of 220 horsepower and that the standard deviation of power delivered is 15 horsepower. A potential buyer intends to sample 100 engines(each engine to be run a single time). What is the probability that the sample mean will be less than 217 horsepower?

Comcast, the computer services company, is planning to invest heavily in online television services. As part of the decision, the company wants to estimate the average no of online shows a family of four would watch per day. A random sample of $n=100$ families is obtained, and in this sample the average no of shows viewed per day is 6.5 and the population standard deviation is known to be 3.2. Construct a 95% confidence interval for the average no of online television shows watched by the entire population of families of four.

A stock market analyst wants to estimate the average return on a certain stock. A random sample of 15 days yields an average (annualized) return of $\bar{X}=10.37\%$ and a standard deviation of $s=3.5\%$. Assuming a normal population of returns, give a 95% confidence interval for the average return on this stock.

In a hypothesis test, the test statistic $Z = -1.86$.

1. Find the p-value if the test is a) left-tailed, b) right-tailed, and c) two-tailed.
2. In which of these three cases will H_0 be rejected at an alpha of 5%

An automatic bottling machine fills cola into 2 lt (2000 cm³) bottles. A consumer advocate wants to test the null hypothesis that the average amount filled by the machine into the bottle is at least 2,000 cm³. A random sample of 40 bottles coming out of the machine was selected and the exact content of the selected bottles are recorded. The sample mean was 1,999.6 cm³. The population standard deviation is known from the past experience to be 1.30 cm³.

1. Test the null hypothesis at an alpha of 5%
2. Assume that the population is normally distributed with the same sd of 1.30 cm³. Assume that the sample size is only 20 but the sample mean is the same 1,999.6 cm³. Conduct the test once again at an alpha of 5%.
3. If there is a difference in the two test results, explain the reason for the difference.