Homework 8

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MAT 251: Probability and Mathematical Statistics

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Confidence Intervals

Exercise 1. Use the given data to find the 95% confidence interval estimate of the population mean μ. Assume that the population has a normal distribution. IQ scores of professional athletes: Sample size $n = 20$. Mean $\bar{x} = 103$. Sample standard deviation $s = 14$.

Exercise 2. A random sample of 30 households was selected as part of a study on electricity usage, and the number of kilowatt-hours (kWh) was recorded for each household in the sample for the March quarter of 2016. The average usage was found to be 375kWh. In a very large study in the March quarter of the previous year it was found that the standard deviation of the usage was 81kWh. Assuming the standard deviation is unchanged and that the usage is normally distributed, provide an expression for calculating a 99% confidence interval for the mean usage in the March quarter of 2016.

Exercise 3. A sample of size $n = 100$ produced the sample mean of $\bar{x} = 16$. Assuming the population standard deviation $\sigma = 3$, compute a 95% confidence interval for the population mean μ

Exercise 4. 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?

Exercise 5. The daily salaries of substitute teachers for eight local school districts is shown. What is the point estimate for the mean? Find the 90% confidence interval of the mean for the salaries of substitute teachers in the region.
    60 56 60 55 70 55 60 55

Exercise 6. A simple random sample of 900 households is taken in a city. The average household size in the sample is 2.2 people, with a standard error of 2 people. Construct 99% confidence interval for the mean household size.

Exercise 7. For a group of 20 students taking a final exam, the mean heart rate was 96 beats per minute. Assuming the heart beats are normal with $\sigma = 5$, find the 90% confidence interval of the true mean.