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**IT-223 Assignment #7**

Each question is worth 10 points.

**Problem 1**

The total study time for a statistics assignment in a population of college students was approximately Normally distributed with a mean of 7.62 hours and standard deviation of 1.85 hours. Suppose you plan to take an SRS of size 250 and compute the average study time.

(a) What is the mean and standard deviation (standard error) of the sample mean?

Mean = 7.62

Standard Error = 1.85/sqrt(250) = .1170

 (b) What is the probability of selecting a sample that has a sample mean that shows that they studied 6.0 hours or less? (Nothing too complicated in this question – it is simply intended as a review of using your z-table. Hint: use the standard error).

The probability of selecting a sample that has a sample mean that shows they have studied for 6.0 hours or less is so low, that on the z-table is essentially 0%.

The value was so far negative that it wasn’t on the z table, therefore, I can only conclude that it is extremely close to 0%.

**Problem 2**

You want to rent an unfurnished one-bedroom apartment in Boston next year. The mean monthly rent for a random sample of 10 apartments advertised in the local newspaper is $1472. Assume that the population standard deviation is $291. Find the 90%, 95%, and 99% confidence intervals for the mean monthly rent for this category of apartments.

We have x = $1472, σ = $291, and n = 10.

The 90% confidence interval gives 1472 ± 1.645(291/sqrt 10) ⇒ 1472 ± 1.645(92.02) ⇒ 1472 ± 151.37.

The 90% confidence interval is ($1314.63, $1623.37)

The 95% confidence interval gives 1472 ± 1.96 (291/sqrt 10) ⇒ 1472 ± 1.96(92.02) ⇒ 1472 ± 180.35.

The 95% confidence interval is ($1291.64, $1652.35)

The 99% confidence interval gives 1472 ± 2.575 (291/sqrt 10) ⇒ 1472 ± 2.575(92.02) ⇒ 1472 ± 236.95.

The 99% confidence interval is ($1235.05, $1708.95)

Look at the 95% confidence interval and say whether the following statement is true or false. Be sure to explain your answer:

False, this calculation is about estimating the mean apartment rent for a one-bedroom. We do not need to sample 95% of the apartment prices to estimate μ. The 95% is the measure of a probability, the probability that the parameter ( in this case μ) is in the calculated interval.

**Problem 3**

A company manager wants to estimate the average length of phone calls in a call center for a tech support company. In a sample of 80 calls, the mean duration is  211.4 seconds and the sample standard deviation is  163.9 seconds.  (Note: this SD is not the standard error of the mean, but rather the SD of the individual observations in the sample).

1. Describe the distribution of this sample mean (give the sample mean and standard error).

Sample mean = 211.4

Standard Error = sd/ sqrt(n)

163.9/sqrt(80)

163.9/8.94 = 18.33

1. Using a 95% confidence interval, does this appear to be a reasonably accurate estimate of the population value?

211.4 +- 1.96 \* 163.9/sqrt(80)

211.4 +- 1.96 \* 163.9/8.94

211.4 +- 1.96 \* 18.33

Lower: 211.4 – 35.927 = 175.47

Upper: 211.4 + 35.927 = 247.33

Yes, this is a reasonably accurate estimate of the population value because it is within the confidence interval.

**Problem 4**

A newly developed smartphone app is designed to retrieve prices and scheduling information for airline flights. Suppose we want to study how long it takes on average to retrieve this information. We record the processing time for 100 randomly selected flight searches. The sample statistics are:  sample mean = 9.811 seconds and sample standard deviation = 2.972 seconds (Note: this SD is not the standard error of the mean, but rather the SD of the individual observations in the sample).

Give your answer as a properly formatted confidence interval statement.  Choose the “standard” value for C.

Mean = 9.811

SD = 2.972

N = 100

SE = 2.972/sqrt(100) = .2972

C is 95%, so 9.811 +- 1.96 \* .2972

For a population of 100 randomly selected flight searches and known the standard deviation 2.972 seconds, a confidence interval for the sample mean of 9.811 seconds, based on the information given, the Upper interval would be 10.393 seconds and the Lower interval would be 9.228.

I am 95% confident that the time it takes on average to retrieve information through the app lies in the interval between 9.228 seconds and 10.393 seconds.