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Quiz Instructions

Question 1

10 pts

Show your work either using the text box or submitting a file. If you submit a file

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In a study of television viewing habits, it is desired to estimate the average number of hours that teenagers spend watching per week. If it is reasonable to assume that $\sigma = 3.2$ hours, how large a sample is needed so that it will be possible to assert with 95% confidence that the sample mean is off by less than 20 minutes?

To find our desired sample size we must use the formula

$$1.96 \cdot \frac{3.2}{\sqrt{n}} > \frac{1}{3}$$

$$n > 354$$

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14 words



Question 2

10 pts

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The length of the skulls of 10 fossil skeletons of an extinct species of bird has a mean of 5.68cm and a standard deviation of 0.29cm.

- A. Find a 95% confidence interval for the mean length of the skulls of this species of bird.
- B. Provide an interpretation of this interval.
- C. What condition(s) if any must be true for your results to be statistically valid?

A) $5.68 \pm 2.262 \left(\frac{0.29}{\sqrt{10}} \right) = 5.68 \pm .207 \text{ cm}$

B) From 10 fossil skeleton samples, the length of the skulls are 5.68 deviating by .207cm. This is with 95% confidence

C)

1. The two samples must be independent
2. Population greater than 30

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Question 3

10 pts

Show your work either using the text box or submitting a file. If you submit a file **MAKE SURE YOUR NAME IS ON THAT SUBMITTED FILE!**

A major truck stop has kept extensive records on various transactions with its customers. If a random sample of 18 of those records show average sales of 63.84

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B. Provide an interpretation of this interval.

C. What condition(s) if any must be true for your results to be statistically valid?

$$CI = \bar{x} \pm z\alpha/2 * (s/\sqrt{n})$$

$$CI = 63.84 \pm 2.878 * (2.75/\sqrt{18}) = 63.84 \pm 1.865$$

B)

This states there is a confidence interval of **63.84 ± 1.865** saying that people will buy between 61 and 65 gallons of gas

C)

1. The two samples must be independent
2. Population greater than 30

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Question 4

10 pts

Show your work either using the text box or submitting a file. If you submit a file **MAKE SURE YOUR NAME IS ON THAT SUBMITTED FILE!**

Independent random samples from normal populations of size $n_1 = 9$ and $n_2 = 25$ have means and standard deviations, respectively of $\bar{x}_1 = 18.2$ seconds, $S_1 = 4.8$ seconds, $\bar{x}_2 = 23.4$ seconds, and $S_2 = 3.5$ seconds.

A. Find a 90% confidence interval for $\mu_1 - \mu_2$.

B. Provide an interpretation of this interval. Does the interval suggest anything about the two population means?

C

A >  >

A)

$$\alpha / 2 = 0.05$$

$$\frac{4.8^2}{3.5^2} < DF < \frac{4.8^2}{3.12} = \frac{1}{3.12} < DF < 2.36$$

B) There could be very large variation in our intervals

C)

1. The two samples must be independent
2. Population greater than 30

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Question 5

10 pts

Show your work either using the text box or submitting a file. If you submit a file **MAKE SURE YOUR NAME IS ON THAT SUBMITTED FILE!**

The following are the heat-producing capacities of coal from a mine. These measurements are from coal sample taken at the same five random locations before and after the improvements were made in the refining process. The measurements are made in millions of calories per ton and higher is considered better.

Before: 7710, 7890, 7920, 7270, 7860

After: 8500, 8330, 8480, 7960, 8030

- A. Find a 95% confidence interval for After improvements compared to Before.
- B. Provide an interpretation of this interval. Does the interval suggest anything about the two population means?
- C. What condition(s) if any must be true for your results to be statistically valid?

A >  >

$$S1 = \sqrt{(297.76^2/5 + 259.29^2/5)} = 182.44$$

B) Noting the variance enables us to have both positive values, however we have a 77% variance given through the plus on minus gives us an incredibly large and unreliable spread

C)

1. The two samples must be independent
2. Population greater than 30
3. Standard deviations must be equivalent

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110 words



Question 6

10 pts

Show your work either using the text box or submitting a file. If you submit a file **MAKE SURE YOUR NAME IS ON THAT SUBMITTED FILE!**

In a random sample of 250 television viewers in a large city, 190 had seen a certain controversial program.

- A. Find a 95% confidence interval for the corresponding true proportion.
- B. Provide an interpretation of this interval.
- C. What condition(s) if any must be true for your results to be statistically valid?

$$A) P = Z_{\frac{\alpha}{2}} \pm \sqrt{\left(\frac{p(1-p)}{n}\right)} = \sqrt{\left(\frac{0.76(1-0.76)}{250}\right)}$$

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C)

1. The two samples must be independent
2. Population greater than 30
3. Standard deviations must be equivalent

p



41 words



Question 7

10 pts

Show your work either using the text box or submitting a file. If you submit a file **MAKE SURE YOUR NAME IS ON THAT SUBMITTED FILE!**

In a random sample of 300 students eating lunch across the various campus cafeterias, only 102 had desert. If we use this sample proportion of $\frac{102}{300} = 0.34$ as an estimate of the corresponding true proportion, with what confidence can we assert that our error is less than 0.05?

$$Z = 1.96$$

$$A) 0.34 \pm 1.96 \cdot \sqrt{(0.34(1 - 0.34) / 300)} = 0.34 \pm 0.0536$$

Question 8

10 pts

Show your work either using the text box or submitting a file. If you submit a file **MAKE SURE YOUR NAME IS ON THAT SUBMITTED FILE!**

Among 500 marriage license applications chosen at random in a given year, there were 48 in which the woman was at least one year older than the man, and among the 400 marriage license applications chosen at random six years later, there were 68 in which the woman was at least one year older than the man.

A. Find a 90% confidence interval for the differences between the corresponding true proportions of marriage license applications in which the woman was at least one year older than the man. That is, let E = initial time and L = six years later find 90% confidence interval for $p_E - p_L$

B. Provide an interpretation of this interval. Does the interval suggest anything about the two population proportions?

C. What condition(s) if any must be true for your results to be statistically valid?

A)

$$P_w - P_m \sqrt{\left(\frac{P_w(1-P_w)}{nw} + \left(\frac{P_m(1-P_m)}{nm}\right)\right)}$$

$$P_w = \frac{156}{250} = 0.624; P_m = \frac{84}{250} = 0.336$$

$$0.624 - 0.336 \pm 1.96 \cdot \sqrt{\frac{0.624(0.3775)}{250} + \frac{.336 \cdot .668}{250}} = .372$$

B) With a CI not equal to zero, we can say that even though our CI is small it is still statistically significant

C) The populations must be greater than 30, the datasets independent and the

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**Question 9****10 pts**

Show your work either using the text box or submitting a file. If you submit a file **MAKE SURE YOUR NAME IS ON THAT SUBMITTED FILE!**

Referring back to question 2 about skull length of a given species of bird, use that information to:

- A. Construct a 95% confidence interval for the true variance of the skull length of the given species of bird.
- B. Provide an interpretation of this interval.
- C. What condition(s) if any must be true for your results to be statistically valid?

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Show your work either using the text box or submitting a file. If you submit a file **MAKE SURE YOUR NAME IS ON THAT SUBMITTED FILE!**

Referring back to problem 4:

A. Construct a 90% confidence interval for the ratio of the variances of the two populations sampled.

B. Provide an interpretation of this interval. Does the interval suggest anything about the two population variances?

C. What condition(s) if any must be true for your results to be statistically valid?

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