King Fahd University of Petroleum & Minerals
Department of Mathematical Science
STAT-211-Term053
Quiz #7 Section:

Name: ID: *Solutions* Serial:

Q1. (4-Points)

Answer the following questions as **True** if the statement is true and **False** if not.

a. The population mean will always fall within the confidence interval estimate.---False

b. The t-distribution is used to obtain the critical value in developing a confidence interval when the population distribution is not known and the sample size is small. ---False (4) pts

c. Increasing the sample size will result always in a point estimate that is closer to the true population value.---False

d. The purpose of a pilot sample is to provide an idea of what the population standard deviation might be.------True

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Q2 (6 points)

In an application to estimate the mean number of miles that downtown employees commute to work roundtrip each day, the following information is given: $n = 25$, $\bar{x} = 4.32$, $S = 3.45$, then answer the following:

a. What is the point estimate for the true population mean?

The point estimate $= \bar{X} = 4.32$ (1) pt

b. Obtain a 90% confidence interval for the population mean.

$1 - \alpha = .90 \Rightarrow \alpha = .10$

$t_{\alpha/2, n-1} = t_{.05, 24} = 1.7109$

A 90% C.I. for μ is:

$$\bar{X} \pm t_{\alpha/2, n-1} \cdot \frac{S}{\sqrt{n}}$$

$$4.32 \pm (1.7109) \cdot \frac{3.45}{\sqrt{25}}$$

$$4.32 \pm 1.1805$$

$$[3.1395, 5.5005]$$

(3) pts

c. If the sample given is a pilot how many observations are required to estimate the population mean with 99% confidence interval and a margin of error of ± 0.5

$1 - \alpha = 0.99 \Rightarrow \alpha = .01$

$Z_{\alpha/2} = Z_{.005} = 2.575$

$$n = \left(\frac{Z_{\alpha/2} \cdot S}{e}\right)^2 = \left(\frac{(2.575)(3.45)}{0.5}\right)^2$$

$$= 315.6840$$

$$\simeq 316.$$

(2) pts