King Fahd University of Petroleum & Minerals
Department of Mathematics & Statistics
STAT-319-Term073-Quiz5-B

Name: ID: Sec.: Serial:

Q1. In an application to estimate the mean number of miles that downtown employees commute to work roundtrip each day, the following information is given: $n = 20$, $\bar{x} = 4.33$, $S = 3.50$ then:

[5] **a.** Obtain a 95% confidence interval for the population mean.

$1-\alpha = .95 \Rightarrow \alpha = .05 \quad \therefore t_{\alpha/2, n-1} = t_{.025, 19} = 2.093$ } (1) pt

A 95% C.I. for μ is:

$4.33 \pm (2.093)\cdot \frac{3.50}{\sqrt{20}}$ } (2) pts

4.33 ± 1.6380

$2.6920 < \mu < 5.9680$ } (2) pts

[4] b. Find the required sample size if we want to estimate the population mean with 99% confidence interval and a margin of error of ± 0.5

$1-\alpha = .99 \Rightarrow \alpha = .01 \Rightarrow Z_{\alpha/2} = Z_{.005} = 2.575$ } (1) pt

$n = \left(\frac{Z_{\alpha/2}\cdot S}{e}\right)^2 = \left(\frac{(2.575)(3.50)}{.5}\right)^2 = 324.9 \approx 325.$ } (1) pt

(2) pts

Q2. The proportion of parts in an inventory that are outdated and no longer useful is thought to be 0.22. To check this, a random sample of n = 150 parts is selected and 30 are found to be outdated. Based upon this information,

[6] a. Find 98 % confidence interval for the true proportion.

$n = 150, x = 30 \Rightarrow \hat{p} = \frac{x}{n} = \frac{30}{150} = 0.2$ } (1) pt

$1-\alpha = .98 \Rightarrow \alpha = .02 \Rightarrow Z_{\alpha/2} = Z_{.01} = 2.33$ } (1) pt

A 98% C.I. for P is:

$0.2 \pm (2.33)\sqrt{\frac{(.2)(.8)}{150}}$ } (2) pts

0.2 ± 0.0761

$0.1239 < P < 0.2761$ } (2) pts

[5] b. Determine how many items must be sampled to obtain a confidence interval estimate for the population proportion if we want to be at least confidence 90% the error will not be more than $\pm$ 0.03.

$1-\alpha = .90 \Rightarrow \alpha = .10 \Rightarrow Z_{\alpha/2} = Z_{.05} = 1.645$ (1) pt

$n = \frac{Z^2_{\alpha/2}}{4e^2}$ } (2) pts

$= \frac{(1.645)^2}{4(.03)^2} = 751.6736$ } (1) pt

≈ 752 } (1) pt