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

Name: ID: Sec.: Serial:

Q1. In an application to estimate the mean number of miles that downtown employees commute to work roundtrip each day for two different companies, the following information is given:
$n_1 = 20, \bar{x}_1 = 4.33, S_1 = 3.50$ and $n_2 = 10, \bar{x}_2 = 3.75, S_2 = 5.50$ then:

[8] **a.** Obtain a 95% confidence interval for the difference between the truth population means.

$1-\alpha = .95 \Rightarrow \alpha = .05 \quad \therefore t_{\alpha/2, n_1+n_2-2} = t_{.025,28} = 2.048$ ① pt

$S_p^2 = \frac{(20-1)(3.50)^2 + (10-1)(5.50)^2}{20+10-2} = \frac{232.75 + 272.25}{28} = \frac{505}{28} = 18.0357$ } ③ pts

$\therefore S_p = \sqrt{18.0357} = 4.2468$

A 95% C.I. for $(\mu_1 - \mu_2)$ is:

$(4.33 - 3.75) \pm (2.048)(4.2468)\sqrt{\frac{1}{20} + \frac{1}{10}}$ } ② pts

0.58 ± 3.3685

$-2.7885 < \mu_1 - \mu_2 < 3.9485$ } ② pts

[2] b. State the necessary two assumptions needed to construct the C.I in part(a)

1. σ_1^2, σ_2^2 are unknown but equal
2. The two populations are normally distributed. 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 The proportion of parts in an inventory that are outdated and no longer useful is thought to be 0.22. To check this, a random sample of n = 150 parts is selected and 30 are found to be outdated.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

$1-\alpha = .98 \Rightarrow \alpha = .02$

$\therefore Z_{\alpha/2} = Z_{.01} = 2.33$ } 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

[4] b. Determine how many items must be sampled to obtain a confidence interval estimate for the population proportion if we want the error not be more than ± 0.03 and confident 90%

$e = \pm .03, \quad 1-\alpha = .90 \Rightarrow \alpha = .10$

$\therefore Z_{\alpha/2} = Z_{.05} = 1.645$ ① pt

$n = \frac{Z_{\alpha/2}^2 \cdot \hat{p}\hat{q}}{e^2}$ } ② pts

$= \frac{(1.645)^2(.2)(.8)}{(.03)^2} = 481.07$

≈ 482 } ① pt