

*** Solutions ***

King Fahd University of Petroleum & Minerals
Department of Mathematical Science
STAT-212-Term043-I-Quiz #2

Name: _____

ID: _____

Serial: _____

Question One (6-Points)

A large consulting company estimates several components of job cost when preparing a bid. A sample of 8 bids for government projects and a sample of 8 bids for private projects provided the data on the management cost component.

	Government	Private
Mean cost	2.050	3.175
Standard deviation	1.227	1.326

Do the data provide sufficient evidence that the mean is larger for private projects than for government projects? Test using $\alpha=0.05$

- ① 1. $H_0: \mu_1 - \mu_2 \geq 0$ vs $H_A: \mu_1 - \mu_2 < 0$ μ_1 : Pop. mean for government projects
2. Test statistics: $s_p = \sqrt{\frac{(8-1)(1.227)^2 + (8-1)(1.326)^2}{8+8-2}} = 1.2774594$ μ_2 : " " " private "
- $t_c = \frac{2.050 - 3.175 - 0}{(1.2774594) \sqrt{\frac{1}{8} + \frac{1}{8}}} = -1.761308$ ②
3. $\alpha = 0.05$, $t_{\alpha, n_1+n_2-2} = t_{0.05, 14} = 1.7613$
Reject H_0 if $t_c < -t_{\alpha} \Rightarrow -1.761308 < -1.7613 \Rightarrow$ Reject H_0 ①
4. Based on the samples data, private projects is larger than government projects. ①

Question Two (4-Points)

A sample of 160 small business owners from city A and a sample of 155 small business owners from city B were interviewed by phone. Each person was asked about the impact on their business of a proposed new piece of legislation. The following counts were obtained.

	Favorable	Not Favorable	
City A	71	89	160
City B	39	116	155

Test whether the proportions who favor the legislation from the two cities are different or not Use $\alpha=0.05$

- ① 1. $H_0: p_1 - p_2 = 0$ vs $H_A: p_1 - p_2 \neq 0$ p_1 : for city A, p_2 : for city B
2. $\bar{p}_1 = \frac{71}{160} = 0.4438$, $\bar{p}_2 = \frac{39}{155} = 0.2516$, $\bar{p} = \frac{71+39}{160+155} = 0.3492$
- $Z_c = \frac{0.4438 - 0.2516 - 0}{\sqrt{(0.3492)(1-0.3492)(\frac{1}{160} + \frac{1}{155})}} = 3.577$ ①
3. $\alpha = 0.05$, $Z_{\alpha/2} = Z_{0.025} = 1.96$
Reject H_0 if $|Z_c| > Z_{\alpha/2} \Rightarrow 3.577 > 1.96$
 \therefore Reject H_0 . ①
4. The proportions who favor the legislation from the two cities are different. ①