

*** SOLUTIONS ***

King Fahd University of Petroleum & Minerals
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STAT-212-Term043

Quiz #1

Section: 3

Name:

ID:

Serial:

Question One (6-Points)

Over a period of years, toothpaste has received a mean rating of 5.9 on a certain scale, for over all customer satisfaction with the product. Because of a minor unadvertised change in the product, there is concern that the customer satisfaction may have changed. Suppose the satisfaction ratings from a sample of 60 customers have a mean of 5.6 and a standard deviation of 0.87. Do these data indicate that the mean satisfaction rating is different from 5.9? Test using $\alpha=0.05$ by both the critical value approach and the p-value approach.

1. The hypothesis are: $H_0: \mu = 5.9$ vs $H_A: \mu \neq 5.9$ (1)

2. The test statistic value: $n = 60, \bar{x} = 5.6, s = 0.87$
$$Z = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{5.6 - 5.9}{0.87/\sqrt{60}} = -2.67$$
 (1)

3. Decision rule:

a. Using the critical value approach

$$\alpha = 0.05 \Rightarrow Z_{\alpha/2} = Z_{0.025} = 1.96$$

Reject H_0 if $|Z| > Z_{\alpha/2} \Rightarrow | -2.67 | > 1.96 \Rightarrow$ Reject H_0 . (1)

b. Using the p-value

$$p\text{-value} = 2P(Z > |Z_c|) = 2P(Z > 2.67) = 2(0.5 - 0.4962) = 0.0076$$
 (2)

Reject H_0 if $p\text{-value} < \alpha \Rightarrow 0.0076 < 0.05 \therefore$ Reject H_0 .

4. Conclusion The mean satisfaction rating is different from 5.9. (1)

Question Two (4-Points)

A survey of 200 executives revealed that 115 of them would rather leave a message with a voice mail system than a person. Test the claim that half of all executives prefer voice mail systems to leaving a message with a person. Use $\alpha=0.05$

$$n = 200, x = 115$$

1. $H_0: P = 0.5$ vs $H_A: P \neq 0.5$ (1), $\bar{p} = \frac{x}{n} = \frac{115}{200} = 0.575$. (1)

$$2. Z_c = \frac{\bar{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} = \frac{0.575 - 0.5}{\sqrt{\frac{(0.5)(1-0.5)}{200}}} = 2.12$$
 (1)

$$3. Z_{\alpha/2} = Z_{0.025} = 1.96$$

Reject H_0 if $|Z| > Z_{\alpha/2} \Rightarrow 2.12 > 1.96$

\therefore Reject H_0 . (1)

\therefore The claim is not correct.