SOLUTIONS

King Fahd University of Petroleum & Minerals
Department of Mathematical Science
STAT-212-Term051

Name: ID: Serial:

Question One (6-Points)

Suppose that a sample of 100 tiers made by a certain manufacturer lasted an average of 21,800 miles with a sample standard deviation of 1,290 miles. Do the data provide a sufficient evidence to indicate that the average wear is different from 22,000 miles? Test using $\alpha = 0.05$ by both the critical value and the p-value approaches. $n = 100, \ \bar{x} = 21,800, \ s = 1,290$

1. The hypothesis are:

H_0: $\mu = 22,000$ H_A: $\mu \neq 22,000$ (1)

2. The test statistic value:

$$Z_c = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{21,800 - 22,000}{1290/\sqrt{100}} = -1.55$$ (1)

3. Decision Rule:

a. Using the critical value approach

$Z_{\alpha/2} = Z_{.025} = 1.96$

Reject H_0 if $|Z_c| > Z_{\alpha/2} \Rightarrow |-1.55| \not> 1.96$

$\therefore$ Do not reject H_0 (1)

b. Using the p-value approach.

Reject H_0 if P-value $< \alpha$

$P\text{-value} = 2P(Z > |Z_c|) = 2P(Z > 1.55)$

$= 2(.5 - .4394)$

$= 2(.0606) = .1212 \not< .05$

$\therefore$ Do not reject H_0 (2)

4. conclusion:

The average wear is not different from 22,000 miles. (1)