

SOLUTIONS

King Fahd University of Petroleum & Minerals
Department of Mathematics & Statistics
STAT-212-Term063-Quiz1

Name: _____

ID: _____

Serial: _____

Suppose that a sample of 50 tires 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.

1. The hypothesis are:

$$H_0: \mu = 22,000$$

$$H_A: \mu \neq 22,000 \quad (2\text{-points})$$

2. The test statistic value:

$$Z_c = \frac{\bar{X} - \mu_0}{S/\sqrt{n}} = \frac{21,800 - 22,000}{1,290/\sqrt{50}} = -1.0963 \approx -1.10 \quad (2\text{-points})$$

3. Decision Rule:

a. Using the critical value approach

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

$$\text{Reject if } H_0: |Z_c| > Z_{\alpha/2} \Rightarrow |-1.10| \not> 1.96 \quad (1\text{-point})$$

So, don't reject H_0

b. Using the p-value approach.

$$P\text{-value} = 2P(Z > |Z_c|) = 2P(Z > 1.10)$$

$$= 2(0.5 - 0.3643) = 0.2714$$

(3-points)

$$\text{Reject } H_0 \text{ if the } P\text{-value} < \alpha \Rightarrow 0.2714 \not< 0.05$$

So, don't reject H_0

4. conclusion:

Based on the sample information, the average wear is NOT different from 22,000 miles. (1-point)

5. Based in your decision which Type of errors may be occurred?

Because H_0 was not rejected, then Type II error may be occurred. (1-point)