

## SOLUTIONS

King Fahd University of Petroleum & Minerals  
Department of Mathematical Science  
STAT-212-Term061

Name: \_\_\_\_\_

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Serial: \_\_\_\_\_

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**(2+2+2+2+1+1 = 10 Points)**

Suppose that a sample of 100 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:

$$H_0: \mu = 22000$$

$$H_A: \mu \neq 22000$$

2. The test statistic value:

$$Z_c = \frac{\bar{x} - \mu_o}{S/\sqrt{n}} = \frac{21800 - 22000}{1290/\sqrt{100}} = -1.55$$

3. Decision Rule:

a. Using the critical value approach

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

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

$\therefore$  Do not reject  $H_o$

b. Using the p-value approach.

Reject  $H_o$  if the p-value  $< \alpha$

$$\begin{aligned} \text{p-value} &= 2 P(Z > |Z_c|) \\ &= 2 P(Z > 1.55) = 2 (0.5 - 0.4394) \\ &= 2 (0.0606) = 0.1212 \not< 0.05 \end{aligned}$$

$\therefore$  Do not reject  $H_o$

4. conclusion:

The average wear is not different from 22000 miles

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

Because  $H_o$  was not rejected, Type II error may be occurred