

# \*SOLUTIONS\*

King Fahd University of Petroleum & Minerals

Department of Mathematical Science

STAT-212-Term051-II -Quiz #3

Name:

ID:

Serial:

## Question One (5-Points)

In a large company of car batteries, it is assumed that the life batteries is approximately normally distributed. If a manufacturer of that company claims that the batteries life has a standard deviation more than 0.9 year, test his claim if a sample of 10 batteries yields a standard deviation of 1.1 years. Use  $\alpha = 0.05$

$$n = 10, s = 1.1, \alpha = 0.05$$

$$1. H_0: \sigma^2 \leq (0.9)^2 = 0.81 \quad \text{vs} \quad H_A: \sigma^2 > (0.9)^2 = 0.81 \quad \} \textcircled{1}$$

$$2. \chi_c^2 = \frac{(n-1) s^2}{\sigma_0^2} = \frac{(9)(1.1)^2}{(0.9)^2} = 13.4444 \quad \} \textcircled{1}$$

$$3. \chi_{\alpha, n-1}^2 = \chi_{0.05, 9}^2 = 16.9190 \quad \} \textcircled{1}$$

Reject  $H_0$  if  $\chi_c^2 > \chi_{\alpha, n-1}^2 \Rightarrow 13.4444 \not> 16.9190 \quad \} \textcircled{1}$   
 $\rightarrow$  Do not reject  $H_0$

4. Conclusion: Batteries life has a standard deviation NOT more than 0.9 year. (The claim is not correct).  $\textcircled{1}$  pt

## Question Two (5-Points)

A study is conducted to compare the length of time between men and women to assemble a certain product. Past experience indicate that the distribution of times for both men and women is approximately normal. A random sample of times for 13 men and 14 women produced the following data:

Men	Women
$n_1 = 13$	$n_2 = 15$
$S_1 = 6.1$	$S_2 = 5.3$

Do these data provide a sufficient evidence to conclude that the variance for men is different from women? Test using  $\alpha = 0.05$

$$n_1 = 13, n_2 = 15$$
$$S_1 = 6.1, S_2 = 5.3$$

$$1. H_0: \sigma_1^2 = \sigma_2^2 \quad \text{vs} \quad H_A: \sigma_1^2 \neq \sigma_2^2 \quad \} \textcircled{1}$$

$$2. F_c = \frac{S_1^2}{S_2^2} = \frac{(6.1)^2}{(5.3)^2} = 1.3247 \quad \} \textcircled{1}$$

$$3. F_{\frac{\alpha}{2}, n_1-1, n_2-1} = F_{0.025, 12, 14} = 3.050 \quad \} \textcircled{1}$$

$$\text{Reject } H_0 \text{ if } F_c > F_{\alpha/2, n_1-1, n_2-1}$$
$$1.3247 \not> 3.050 \quad \} \textcircled{1}$$

Do not reject  $H_0$

4. Conclusion: The variance for men is NOT different from women.  $\textcircled{1}$

(The claim is NOT correct).