QUIZ 6 BUM2413, APPLIED STATISTICS, SEM II 2013/2014

MATRIC NO.: (B) 300 [illegible] SECTION: [illegible]

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Question 1 (3 points)

In the past, the standard deviation of diameter for a certain tyre model is 2.07 inch. A random sample of ten tyres showed a standard deviation of 2.93 inch. Find the 95% confidence interval for the variance of the diameter of all tyres. Given that, $\chi^2_{0.025,9} = 19.0228$ and $\chi^2_{0.975,9} = 2.7004$.

$n = 10 \quad s = 2.93$

$\chi^2_{\alpha/2,v} = \chi^2_{0.05/2,n-1} = \chi^2_{0.025,9} = 19.0228$

$\chi^2_{1-\alpha/2,v} = \chi^2_{1-0.05/2,n-1} = \chi^2_{0.975,9} = 2.7004$

A 95% CI for population variance

$$\left(\frac{(10-1)(2.93)^2}{19.0228}, \frac{(10-1)(2.93)^2}{2.7004} \right)$$

$= (4.0617, 28.6121)$

Question 2 (7 points)

A sporting goods manufacturer claims that the variance of the strength of a certain fishing line is at least 15.9. A random sample of 15 fishing line spools has a variance of 21.8. At $\alpha = 0.05$, is there enough evidence to reject the manufacturer's claim? Assume the population is normally distributed.

$n = 15 \quad s^2 = 21.8$

Step 1: $H_0: \sigma^2 \leq 15.9$

$H_1: \sigma^2 > 15.9$

Step 2: $\chi^2_{df=14} = \frac{(15-1)(21.8)}{15.9} = 19.1950$

Step 3: $\alpha = 0.05$, draw it

$\chi^2_{0.05,14}$

Step 4: $\chi^2_{0.95,14} = 5.6287$ 23.6848

$\chi^2_{df=14} > \chi^2_{0.05}$, decision rule to reject H_0

Step 5: Therefore, there is enough evidence to reject the manufacturer's claim at $\alpha = 0.05$