Math 346 Quiz #7 - Take Home Name________________________

Show all work. Your answers must be fully justified.

Use this sheet as a cover sheet and staple all relevant work by hand and any computer printouts to this page.

The significance level for all of the hypothesis tests on this quiz is $\alpha = 0.05$. For each test, you may use either the traditional or $p-$value method, but clearly indicate which one you are using If you use Excel or the calculator to complete a hypothesis test, make sure to include enough written work to demonstrate your understanding of the concepts.

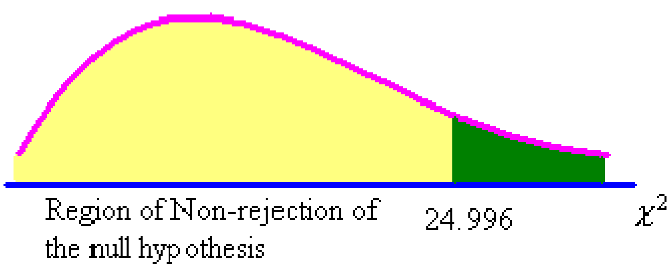
1. The data file cholest.xls represents cholesterol levels recorded from 20 male patients (denoted by gender = 1) and 20 female patients (denoted by gender = 2). Using the data from this file, test the claim that the standard deviation of the cholesterol level in men is greater than 70.

$$\text{Claim} : \sigma > 70$$

$$H_0 : \sigma \leq 70 \qquad H_1 : \sigma > 70$$

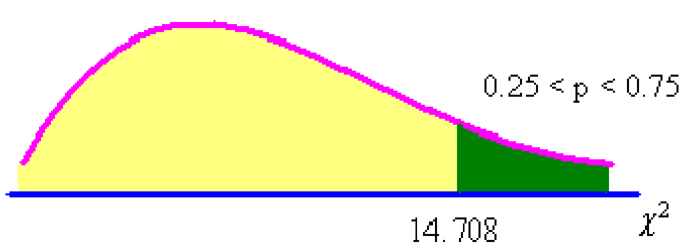
$$\text{The test statistic is } \chi^2 = \frac{(n-1)\,s^2}{\sigma^2} = \frac{(16-1)\,(69.31462)^2}{70^2} = 14.708$$

Traditional Method :



So the test statistic falls in the region of non-rejection of H_0.

$p -$ Value Method :



So $p > \alpha$.

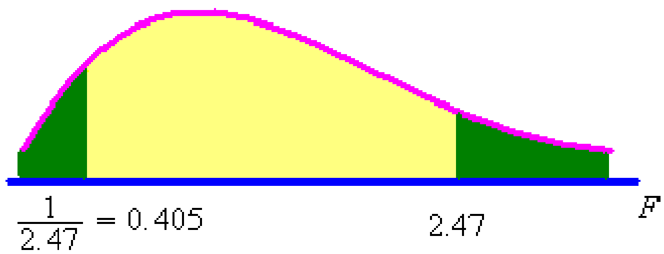
Thus, we don't reject H_0.

The evidence does not support the claim that the cholesterol level in men is greater than 70.

2. Using the data from the file cholest.xls, test the claim that the standard deviation of the cholesterol level in men is the same as the standard deviation of the cholesterol level in women.

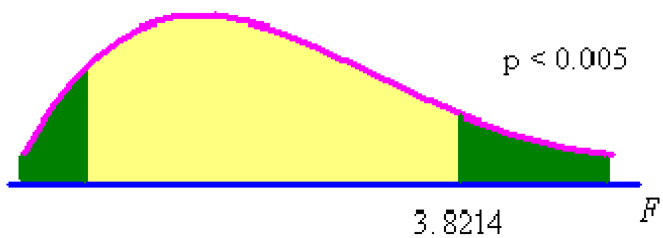
$$\text{Claim:} \quad \sigma_1 = \sigma_2$$
$$H_0 : \sigma_1 = \sigma_2 \qquad H_1 : \sigma_1 \neq \sigma_2$$
$$\text{The test statistic is } F = \frac{s_1^2}{s_2^2} = \frac{(69.31462)^2}{(35.45785)^2} = 3.8214$$

Traditional Method :



So the test statistic falls outside the region of non-rejection of H_0.

$p-$ Value Method :



(Or, from the calculator, we get exactly $p = 0.00395$)
So $p < \alpha$.

Thus, we reject H_0.
The evidence does not support the claim that the standard deviation of the cholesterol level in men is the same as in women.

3. Create the contingency table associated with the data in problem 2.36 on Page 81 in your book. Use it to test the claim that there is no difference proportionately between the optimized and unoptimized programs in the kinds of references that occur in the program.

Observed :

	register	immediate	indirect	Totals
unoptimized	186	45	88	319
optimized	88	29	47	164
Totals	274	74	135	483

Expected (under equal proportionality claim) :

	register	immediate	indirect	Totals
unoptimized	180.96	48.874	89.161	319
optimized	93.035	25.126	45.839	164
Totals	274	74	135	483

From the calculator, we get a test statitstic of $\chi^2 = 1.3614$ and $p = 0.50626 > \alpha$.

Thus, we don't reject H_0.
Based on the data, there is no difference between the proportions of types of references between the unoptimized and optimized program.