# Lab 8: Even More Hypothesis Testing: Variances of Two Populations

# (Chapter 5)

## Objectives

* Apply the F statistic to test hypotheses about population variances

We continue our studies on hypothesis testing by considering tests involving differences between variances of two separate populations. In other tests involving two populations, we tested the actual difference () between the means. Now, we must use a new distribution, the F distribution, which is derived based on the ratio of the chi-squared variable divided by the degrees of freedom for the second population, to the chi-squared variable divided by the degrees of freedom for the first population, as derived in class and using equation 4-53:

For our hypothesis testing though, **our F test statistic can just be calculated as** **the ratio between the sample variance divided by the population variance of the second population, to the sample variance divided by the population variance of the first population**. This is assuming that the two normal populations are independent at that the ratios above are chi-squared random variables. Then, we can proceed forward as on page 261, just like in other hypothesis tests:

|  |  |
| --- | --- |
| **Test** | **Test Statistic** |
| Difference in the ratio of the two variances of two populations (5-5) |  |

**Note that since each test statistic will have three separate variables (α, u, and v) we have separate charts for each alpha value and then we interpolate our F statistic based on u and v (or use Excel functions fdist and finv).**

## Lab 8 Exercises

You can use JMP or Excel for any calculations, as long as you are able to explain your answers and show your work.

For the following data, s1 = 2.54, s2 = 4.50, n1 = 10, n2 = 7, answer the following questions.

1. State the appropriate hypothesis test to see if the sample variances are the same.
2. Find the appropriate F statistic(s) for your hypothesis test for α = 0.05.
3. Using the F statistics found above, determine the conclusion of your hypothesis test.
4. Find the 95% confidence (two sided) interval bounds on the ratio of variances.
5. What is the practical meaning of this interval?