# Relationship Between the F Test Statistic and P-Value.

This activity is designed to enhance understanding of the one-way analysis of variance procedure for a hypothesis test of the claim that three or more samples come from populations having the same mean.

For this hypothesis test, the null hypothesis is the claim that the population means are all equal.

The alternative hypothesis is the claim that at least one of the populations has a mean that is different from the others.

Specifically, in this activity we review the relationship between the *F* test statistic and P-value using the flowchart shown.

First, we compute and compare the sample means.

If the sample means are all close, then the *F* test statistic will be small and the P-value will be large.

We FAIL TO REJECT the null hypothesis that the population means are equal.

Remember, a large P-value shows that the means are all relatively close together.

However, if at least one sample mean is very different the F test statistic will be large and the P-value will be small.

We reject the hypothesis that the population means are equal.

Remember, a small P-value shows that at least one of the means is very different from the others.

The key takeaway is this: Only a SMALL P-value indicates that the population means are NOT all the same - - - at least one of them is different from the others.

Now, it is time to test your knowledge.

Let’s try another one.

In this activity we reviewed the relationship between the F test statistic and P-value using the flowchart shown.

Remember, a large P-value shows that the sample means are all relatively close together.

Only a SMALL P-value indicates that the population means are NOT all the same - - - at least one of them is different from the others.

Congratulations, you have mastered an important concept of Statistics!

Remember, if the p-value is low, then the null hypothesis must go. Time for me to go.