# Relationships Among χ2 Test Statistic, P-Value and Goodness-of-Fit.

When conducting a hypothesis test for goodness-of-fit, it is helpful to UNDERSTAND the ways that the χ2 test statistic and the P-value are related. It is also important to know how to form conclusions about the goodness-of-fit.

In this activity, we use the flowchart to identify the relationships among the chi-square test statistic, the P-value, and the conclusion about goodness-of-fit.

When testing for goodness-of-fit, compare the OBSERVED values with the corresponding EXPECTED values.

This notation is designed to be easy, "with *O* representing “observed,” and *E* representing “expected.”

If the observed values *O* and expected values *E* are close together in value, their differences are small, so the chi-square test statistic is small and the *P*-value is large.

With a LARGE *P*-value, *fail to reject* the null hypothesis that there is a good fit with the claimed distribution.

That is, there appears to be goodness-of-fit.

Based on the available sample data, it appears that there is a good fit with the claimed distribution.

On the other hand, if the observed values *O* and the expected values *E* are far apart, their differences are large, so the chi-square test statistic is large, and the *P*-value is small.

With a SMALL *P*-value, reject the hypothesis that there is a good fit with the claimed distribution.

There does not appear to be a good fit with the assumed distribution.

In other words, there does not appear to be goodness-of-fit.

Now, it is time to test your knowledge.

Let's try another one.

Let's try another one.

This animated flowchart describes the relationships among the chi-square test statistic, the *P*-value, and the conclusion about goodness-of-fit.

Remember, when observed and expected values are close there is goodness-of-fit, and when observed and expected values are far apart there is not goodness-of-fit.

Congratulations, you have mastered an important concept of Statistics!

You are a good fit with your statistics course.