<u>Section 14.1: Chi – Square Test for Goodness of Fit</u>

This is used to determine if <u>observed proportions</u> (*several proportions from the same population*) **significantly differ from the hypothesized population distribution.**

This test is **not** used when you want to compare a single proportion with its hypothesized proportion with a distribution.

Like the other significance tests, the process is similar…

1) **Hypotheses**

2) **Conditions**

3) **Test Statistic**

4) **Conclusion**

Hypotheses:

H_0 : actual population proportions = hypothesized proportions

p_1 = ***, p_2 = ***, p_3 = ***, etc. (subscripts should be descriptive)

OR all population proportions are = to each other

$p_1 = p_2 = p_3 = \ldots = p_n$

H_a : at least 1 or 2 of the actual population proportions differ from

their hypothesized proportions

Conditions:

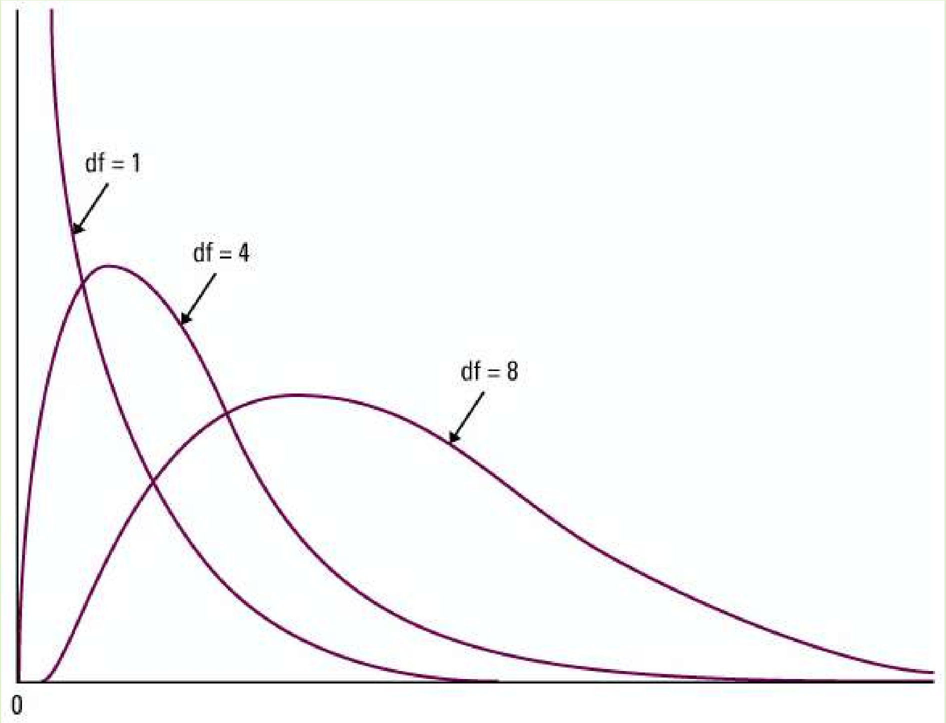
1) All individual expected counts are at least 1
2) No more than 20% of expected counts are ≤ 5

Test Statistic: $\chi^2 = \sum \frac{(O-E)^2}{E}$ O = observed count (sample)

E = expected count (p_x•n)

This is similar to calculating the variance of a set of data.

This value approximates a χ^2 (*chi - squared*) value with n - 1 degrees of freedom. Like the t - distribution, the χ^2 distribution becomes more normal as the degrees of freedom increases.



You can now use a χ^2 table to find a P-value.

Using a determined α value, your conclusion (as usual) is to reject or fail to reject the null hypothesis. **Be sure to write your conclusion in context…**

(if $P < \alpha$) we can conclude that the distribution of _________ varies significantly from the distribution specified/claimed/hypothesized.

(if $P \geq \alpha$) there is insufficient evidence to conclude that the distribution of ________ varies significantly from the distribution specified/claimed/hypothesized.

See the Technology Toolbox on pages 843 – 845 for using the calculator for this significance test.

The category that contributes the largest $\frac{(O-E)^2}{E}$ value to the X^2 statistic is

called the **largest component** of the chi – square statistic. This is a good to identify when writing your conclusion to show why the observed and hypothesized proportions vary.

Example: Often in college, courses are taught by teaching assistants (TA's). In a large statistics course, one section is taught by the full time professor and the other hundreds of students are taught by TA's. Below is the grade distribution for the sections taught by TA's and the counts for the grades assigned by the section taught by the professor.

Grade:	A	B	C	D/F
Probability:	0.32	0.41	0.20	0.07

Grade:	A	B	C	D/F
Count:	22	38	20	11

Is there significant evidence that the professor's grade distribution varies from the teaching assistants'?