Chi-Squared Test for Association

Workshop

1. There is evidence that the opinions of Americans on evolution have changed in the last few years. Here is data from Gallup comparing the results of two polls, one from 2001 and one from 2017. The counts are the number of people who agree with each of the statements.

	2001		2017	
Humans evolved with God's guidance	380	(37.4%)	384	(38.0%)
Humans evolved, God played no part	123	(12.1%)	192	(19.0%)
God created humans in their present form	462	(45.5%)	384	(38.0%)
Other/no opinion	51	(5.0%)	51	(5.0%)
Total	1016	(100%)	1011	(100%)

- (a) This table has $\chi^2 = 22.3$. How many degrees of freedom does this χ^2 statistic have?
- (b) Based on the column proportions (which are in parentheses), Which categories have seen the biggest shifts in opinion since 2001?
- (c) Could these shifts in opinion just be random error in these surveys? Or do they really reflect a change in the attitudes of Americans about evolution? Use the Probability Distributions app to find the p-value and explain what it means in this context.
- 2. The General Social Survey asked people "In general how do you feel about your time? Do you always feel rushed, sometimes feel rushed, or almost never feel rushed?" The results of the survey are broken down by gender in the two-way table below.

	Male	Female	Total
Always	116	188	304
Sometimes	229	284	513
Never	82	78	160
Total	427	550	977

(a) Draw a segmented bar graph showing the row proportions in the two way table above.

(b) The table above has $\chi^2 = 7.69$. Find the degrees of freedom and the p-value for the χ^2 -test, then explain what it means about whether there is a difference between how rushed men and women feel in the population.