

KEY: Homework #18B -  $\chi^2$  "Chi Squared"

1. Test whether you could say more than half of people favor gay marriage based on this sample. *On this and other problems, look-up  $\chi^2_{critical}$  and state whether you retain or reject the  $H_0$ .*

	Approve	Oppose	
OF	45	30	N = 75
EF	37.5	37.5	
	50%	50%	

$$\chi^2 = \sum \frac{(OF - EF)^2}{EF} = \frac{(45 - 37.5)^2}{37.5} + \frac{(30 - 37.5)^2}{37.5}$$

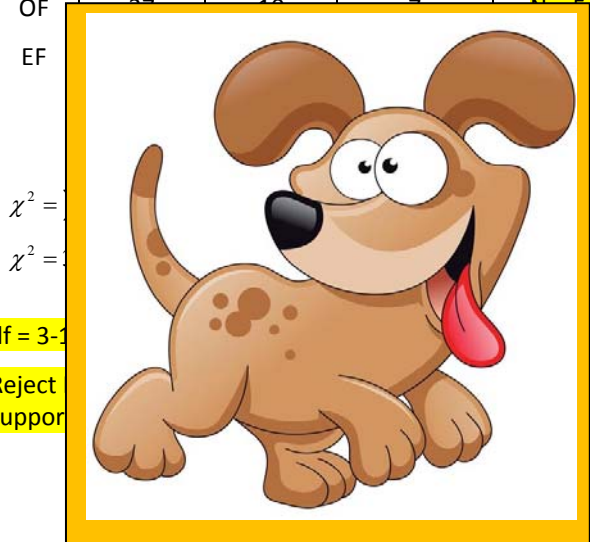
$$\chi^2 = 1.5 + 1.5 = 3.0$$

df = 2-1 = 1,  $\chi^2_{critical} = 3.841$

Retain  $H_0$ , 50% -50% split is possible.

2. You compare the beliefs about global warming of WU students to the national breakdown. Test the hypothesis that Winthrop Students are more supportive.

	True	False	Don't Know
OF	27	18	7
EF	27	18	7



df = 3-1

Reject support

3. A researcher wants to know if those who had a heart attack (vs. those that didn't) were more likely to be red-meat eaters. Conduct the Test for Independence with the following data:

		Red-Meat Eater		
		Yes	No	
Heart Attack	Yes	20 14	8 14	28
	No	10 16	22 16	32
		30	30	N=60

$$\chi^2 = \frac{(20-14)^2}{14} + \frac{(8-14)^2}{14} + \frac{(10-16)^2}{16} + \frac{(22-16)^2}{16}$$

$$\chi^2 = 2.571 + 2.571 + 2.250 + 2.250 = 9.642$$

df = (R-1)\*(C-1) = 1 \* 1 = 1,  $\chi^2_{critical} = 3.841$

Reject  $H_0$ , Red-Meat eaters significantly more likely to have a heart attack.

4. A researcher wonders if Political Affiliation (Dem, Rep, or Independent) relates to support for gay marriage.

		Political Affiliation			
		Dem	Rep	Indep	
Gay Marriage	Approve	15 9.103	2 9.103	7 5.793	24
	Oppose	7 12.897	20 12.897	7 8.207	34



$\chi^2 = (15 - 9.103)^2 / 9.103 + (2 - 9.103)^2 / 9.103 + (7 - 5.793)^2 / 5.793 + (7 - 12.897)^2 / 12.897 + (20 - 12.897)^2 / 12.897 + (7 - 8.207)^2 / 8.207$

$\chi^2 = 3.8$

df = (R-1)

Reject  $H_0$

riage.