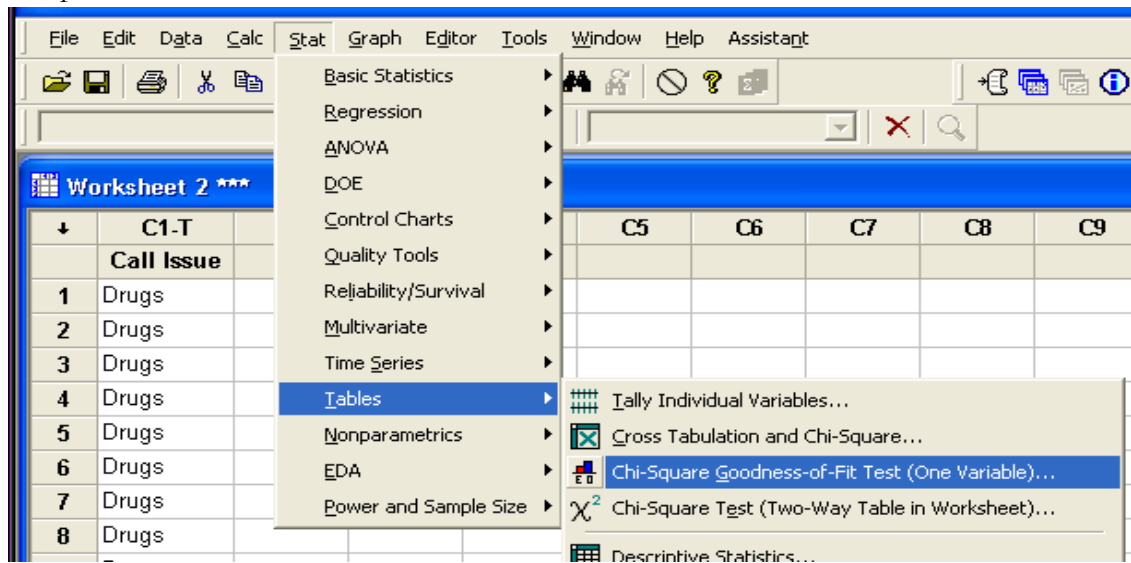


Goodness of Fit Test

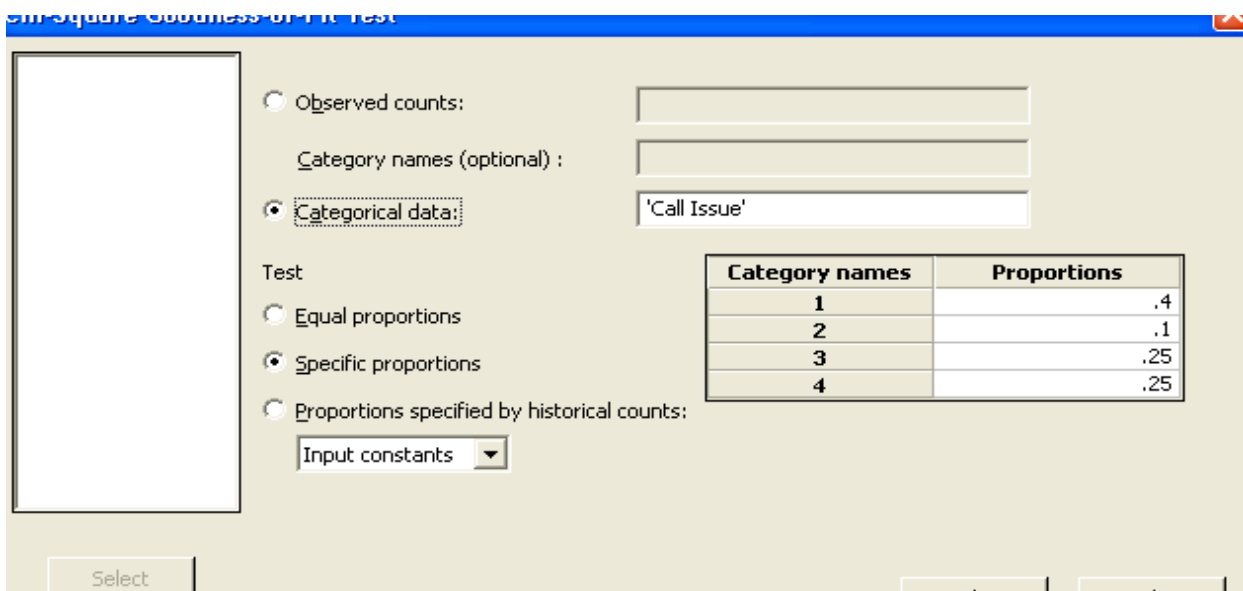
Problem: Volunteers at a teen hotline have been assigned based on the assumption that 40% of all calls are drug related, 25% are sex related, 25% are stress related, and 10% concern educational issues. For this investigation each call is classified into one category based on the primary issue raised by the caller. The data is available at U:\\_MT Student File Area\hjkim\STAT380\Minitab tutorial\teenhotlines.mtw. To test

$$H_0 : p_1 = 0.4, p_2 = 0.25, p_3 = 0.25, p_4 = 0.1, \quad H_A : H_0 \text{ is false}$$

By clicking on the **Stat** and **Tables** and **Chi-Square Goodness-of-Fit**, the Chi-Square window will be opened.



Since we are working with raw data and not a frequency table, we then move the variables into the “Categorical data” areas. To assign the Expected Values, under “Test” select “Specific Proportions”, then enter the expected values in the boxes provided. Keep in mind: the category names will be alphabetized and may not be in the order you expect.



Click “Ok”. The Chi-square table will appear in the output window.

### Chi-Square Goodness-of-Fit Test for Categorical Variable: Call Issue

Category	Observed	Test		Contribution to Chi-Sq
		Proportion	Expected	
Drugs	52	0.40	48	0.33333
Educational	9	0.10	12	0.75000
Sex	38	0.25	30	2.13333
Stress	21	0.25	30	2.70000

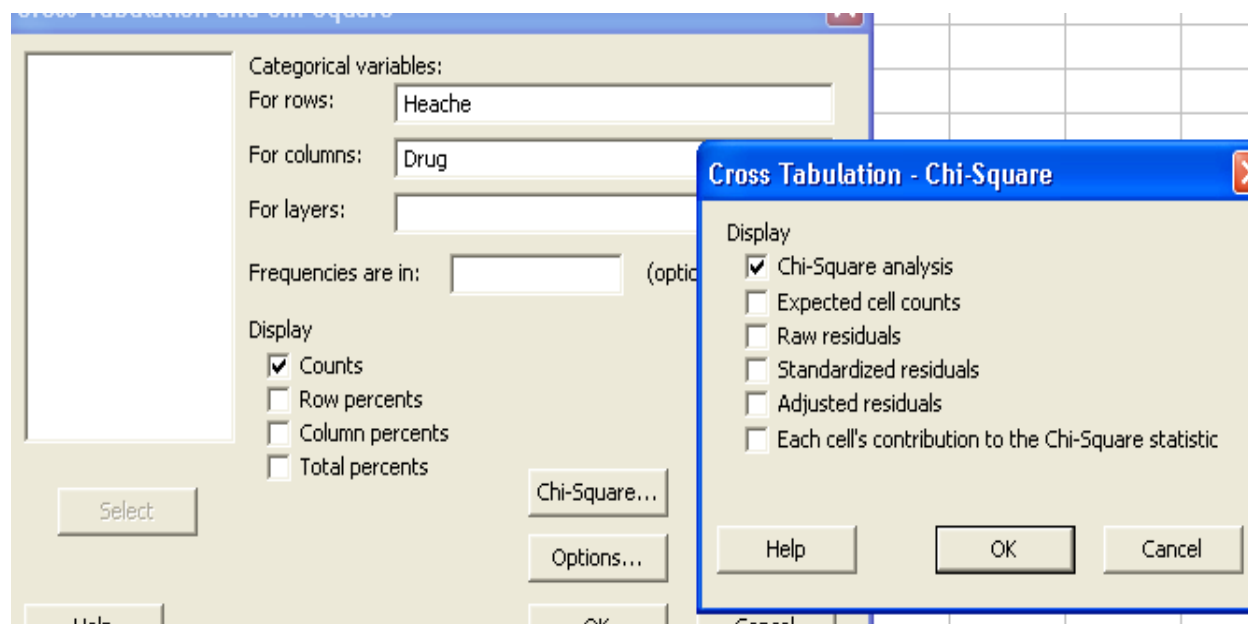
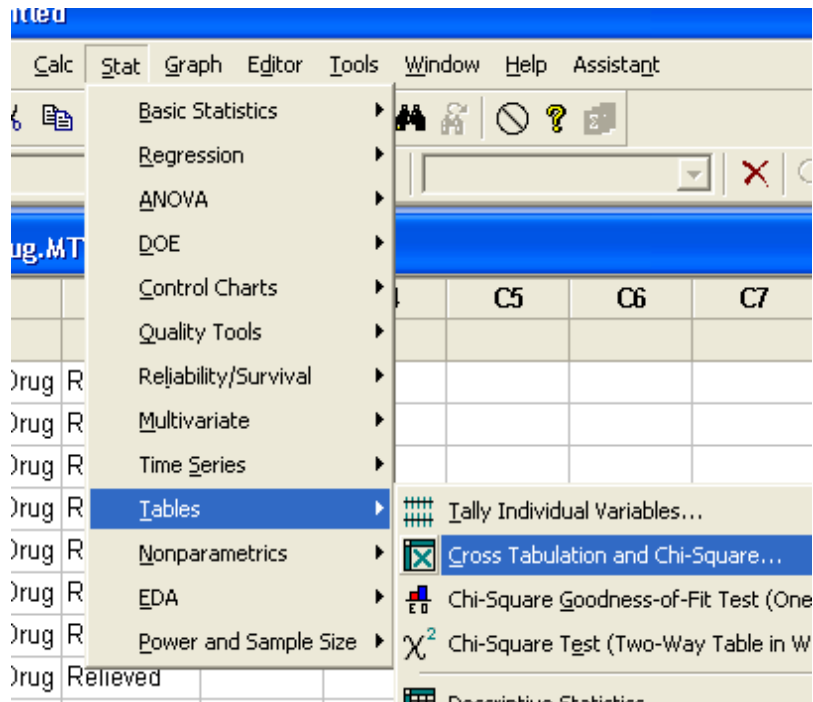
N	N*	DF	Chi-Sq	P-Value
120	0	3	5.91667	0.116

Here, the test statistics is 5.917 and the degrees of freedom is 3 and the p-value is .116. We fail to reject the null hypothesis because the p-value is larger than .05. We do not have significant evidence,  $\alpha=0.05$ , to show that the distribution of topic issues in the class placed to the teen hotline is not as assumed.

### Test of Independence

Problem: A new drug is being compared to an existing drug for its effectiveness in relating headache pain. One hundred subjects who suffer from chronic headaches are randomly assigned to either Group 1: Existing Drug, or Group 2: New Drug. Subjects do not know which drug they are taking in this experiment. Among 50 subjects assigned to Group 1, 28 reported relief from headache pain and among 50 subjects assigned to Group 2, 34 reported relief. Is there evidence of a significant relationship between the Drug and headache pain relief? The data is available at U:\\_MT Student File Area\hjkim\STAT380\Minitab tutorial\headachedrug.mtw

By clicking on the **Stat** and **Table** and **Cross Tabulation and Chi-Square**, the Cross Tabulation and Chi-Square window will be opened.



We then move the variables into the appropriate areas (For rows or For columns). Click the “Chi-Square” box near the bottom of the window. Cross Tabulation - Chi-Square window will appear. Then check “Chi-Square analysis” at the top of the list. Click “Ok” to continue and “Ok”. The following table will appear in the output window.

**Tabulated statistics: Heache, Drug**

Rows: Heache Columns: Drug

	Existing Drug	New Drug	All
No Change	22	16	38
Relieved	28	34	62
All	50	50	100

Cell Contents: Count

Pearson Chi-Square = 1.528, DF = 1, P-Value = 0.216  
Likelihood Ratio Chi-Square = 1.533, DF = 1, P-Value = 0.216

Here, the test statistics is 1.528 and p-value is .216. Thus, we fail to reject the null hypothesis. We do not have significant evidence to show that the Drug and headache relief are not independent.