p. 867 HW

(19) a) Parameters: p_1 = the true proportion of patients who previously had a stroke and had a second stroke when given a placebo

p_2 = the true proportion of patients who previously had a stroke and had a second stroke when given aspirin

p_3 = the true proportion of patients who previously had a stroke and had a second stroke when given dipyridamole

p_4 = the true proportion of patients who previously had a stroke and had a second stroke when given both aspirin and dipyridamole

Test: χ^2 test for homogeneity

Hypotheses: H_0: $p_1 = p_2 = p_3 = p_4$

H_a: $p_1 \neq p_2 \neq p_3 = p_4$

H_0: the proportion of patients who previously had a stroke and have a second stroke is the same for all groups

H_a: the proportion of patients who previously had a stroke and have a second stroke is not the same for all groups

Conditions:

① SRS - not stated, no reason to assume otherwise

② exp counts ≥ 1 (see table) Condition met

80% of exp counts ≥ 5 (see table) Condition met

(19) cont'd

Treatment	Stroke	No Stroke	Total
Placebo	250 (205.8)	1399 (1443.2)	1649
Aspirin	206 (205.8)	1443 (1443.2)	1649
Dipyridamole	211 (206.4)	1443 (1447.6)	1654
Both	157 (205.9)	1493 (1444.1)	1650
	824	5778	6602

$$\chi^2 = \sum \frac{(Obs-exp)^2}{exp} = 24.243 \qquad df = (4-1)(2-1) = 3 \qquad \alpha = .05$$

$$P(\chi^2 \geq 24.243) = 0.00002$$

Since our p-value of 0.00002 is smaller than our significance level of $\alpha = .05$, we have evidence to reject the null. We can conclude that the proportions are different for the different treatments for strokes.

χ^2 Components:

$\frac{(obs-exp)^2}{exp}$

	Stroke	No Stroke
Placebo	9.5	1.4
Aspirin	0	0
Dipyridamole	0.1	0.01
Both	11.6	1.7

** I put obs $\to L_1$, exp $\to L_2$ then let L_3 calculate $\frac{(L_1-L_2)^2}{L_2}$

The largest contributions to the χ^2 statistic come from the placebo group and the group taking both drugs. The placebo group had many more strokes than expected. The group taking both drugs had much fewer strokes than expected.

* Know how to interpret individual components

p.878 HW

#29 Test: χ^2 - test for association

Hypothesis: H_0: there is not association between gender and where young adults live

H_{a1}: there is an association between gender and where young adults live

Conditions:

① SRS - random sample, no reason to expect otherwise

② exp counts ≥ 1 (see table) Condition met

~~80% exp counts ≥ 5 (see table) Condition met~~

	Female	Male	TOTAL
Parent's Home	923 (978.49)	986 (930.51)	1909
Institutional Home	144 (141.47)	132 (134.53)	276
Own Place	1294 (1241.95)	1129 (1181.05)	2423
Group Quarters	127 (126.09)	119 (119.91)	246
TOTAL	2488	2366	4864

Components of χ^2 for each cell: $\frac{(obs-exp)^2}{exp}$

	3.147	3.309
	0.045	0.048
	2.181	2.294
	0.007	0.007

(use L_1, L_2, & L_3 to calculate)

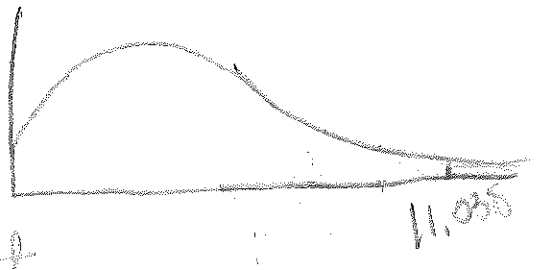
(29) cont'd

Calculation: $\chi^2 = 3.147 + 3.309 + 0.045 + 0.048 + 2.181 + 2.294 + 0.009 + 0.037$

$= 11.038$ $df = (4-1)(2-1) = 3$

$\alpha = .05$

$P(\chi^2 \geq 11.038) = .012$



Since our p-value of .012 is less than our significance level of .05, we have evidence to reject the null. We can conclude there is an association between gender and where a person lives.

Based on our data, women are less likely to live at home with their parents and more likely to have a place of their own.

(31) a) This is not an experiment because no treatment was imposed on the subjects.

b) Less than 4% nonresponse is low so can feel confident in our results.

c) Test: χ^2 test for association

Hypothesis: H_0: there is no association between diet and consumption and cancer

H_a: there is an association between diet and consumption and cancer.

(31) cont'd Conditions: ① SRS

② exp counts ≥ 1 (see table) Condition met

80% of exp counts ≥ 5 (see table) Condition not

	Low	med	High	Total
Colon Cancer	398 (404.39)	397 (404.19)	430 (416.42)	1225
Rectal Cancer	250 (240.32)	241 (240.20)	237 (247.48)	728
Controls	1368 (1372.9)	1370 (1370.61)	1409 (1402.1)	4147
Total	2016	2015	2076	6107

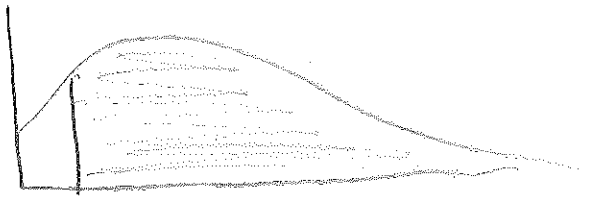
Calculations: $\chi^2 = .101 + .128 + .443 + .390 + .003 + .444 + .008 + .030 + .007$

*Use L1, L2 + L3 to get components →

$df = 4$ $\alpha = .05$

Remember large components have biggest impact on χ^2

$P(\chi^2 \geq 1.552) = .8175$



Since our p-value of 0.8175 is greater than our significance level .05, we have evidence to fail to reject the null. We can conclude there is no association between olive oil consumption and cancer. High olive oil consumption is not more common in patients without cancer.