Homework # 11

Note: Please circle your answers when appropriate!

[Third edition references are in bold and in brackets]

{4th edition references in italics, underlined and in curly brackets}

1) Exercise 10.11, p. 400 **[10.13, p. 408]** *{10.2.1, p. 370, note that what it's asking you to calculate in (b) is* $\hat{p}_1$ and $\hat{p}_2$ *}***.**

But assume the total for column 2 is 300, not 200.

2) Exercise 10.15, p. 401 **[10.17, p. 409]** *{10.2.4, p. 371 (but don't do (c)}*. Get an exact p-value for your χ^{2*}. To do this, use R or a calculator that can do this. In R-commander, type at the script window (or at the command line): "pchisq(χ^{2*},df, lower.tail = FALSE)", where χ^{2*} is your χ^{2*} and df is your degrees of freedom. There are more details on how to do this on the R-notes page.

But assume you have 159 striped individuals and 40 red individuals.

3) Exercise 10.30, p. 412 **[10.35, p. 421]** *{10.3.8, p. 380}. Note that to figure out repulsion or attraction you need to calculate* $\hat{p}_1$ and $\hat{p}_2$.

But assume 70 Maples absent when Hickories are present (instead of 63). This means you will need to calculate χ^{2*} *on your own (you can't use the book value).*

4) 10.65, p. 446 **[10.75, p. 455]** *{not in 4th edition, so reproduced below}***.**. Answer the questions in the body of the problem. ***Note:*** use R (or your calculator) to get the exact p-value (see question 2 for R instructions).

One explanation for the widespread incidence of the hereditary condition known as sickle-cell trait is that the trait confers some protection against malarial infection. In one investigation, 543 African children were checked for the trait and for malaria. The results are shown in the table. Do the data provide evidence in favor of the explanation? The value of the chi-square statistic for this contingency table is $\chi^2_s = 5.33$.

(a) Carry out the chi-square test against a directional alternative at $\alpha = 0.10$.
(b) Interpret the result of the test from part (a) in the context of this setting.

Malaria

		heavy infection	noninfected or lightly infected	**Total**
Sickle	yes	36	100	**136**
cell	no	152	255	**407**
Total		**188**	**355**	**543**

(No changes to the problem).

5) 10.66, p. 446 **[10.76, p. 456]** *{10.S.3, p. 410}*. This is good exercise for doing both goodness of fit and contingency table tests (that's a small hint).

But assume 159 total offspring in the cold environment (instead of 169).

6) 10.41, p. 424 **[10.47, p. 432]** *{not in 4th edition, so reproduced below}***.** Hint: not all the numbers you need are there. You need to figure out the number of people *without* HSV-2 in each region to set up your table (in other words, the "Sample Size" column is really your "totals" column).

Herpes simplex virus type 2 (HSV-2) is a sexually transmitted disease. As part of the third National Health and Nutrition Examination Survey (NHANES III), prevalence of HSV-2 was determined in four regions of the United States. The data are given in the following table.

HSV-2 Prevalence

Region	Sample size	Number	Percent
Northeast	1488	323	21.7
Midwest	2070	381	18.4
South	5323	1,320	24.8
West	2698	712	26.4

(a) use a chi-square test to compare the prevalence rates at $\alpha = .01$. (The value of the chi-square statistic is $\chi^2_s = 49.77$
(b) Verify the value of χ^2_s given in part (a).

(No changes).

BIOL 214: Be prepared to discuss these problems in recitation, Wednesday, July 17th.

BIOL 312: Problems are due at the beginning of lab, Thursday, July 18th.