Name Key
(Please ALSO write your name on the back of the last page.)

Ag 400 - Quiz 3
Makeup - Fall 2006

A. To ascertain whether a certain poultry disease is communicable, that is, whether it is passed from chicken to chicken by contact, an experiment was carried out in which 300 chickens were randomly assigned to three treatment groups. In one group, the chickens had no contact with infected birds. In a second group, the chickens had only moderate contact with infected birds (a few hours). In the third group, the chickens had a great deal of contact with infected birds. After a week of the experiment, the "fate" of each bird was tallied and the following data obtained:

Contact with infected birds	"Fate" of Chicken: Contracted Disease and Died	Contracted Disease Did Not Die	Did Not Contract Disease
	number of chickens		
none	0	16	84
moderate	4	20	80
great deal	2	30	70
	66		234

(26) 1. Test the statistical significance of the relationship between amount of contact with infected birds, and the "fate" of the chicken. Use the .05 level to determine statistical significance. Report the following:

a. State the Null Hypothesis and the Alternative Hypothesis in words, not statistical symbols.

H_0: there is no relationship between contact with infected birds & the likelihood of contracting the disease

H_A: there is a relationship. . .

b. Show the necessary calculations.

f_o	f_e	$f_o - f_e$	
16	22	6	$36/22 = 1.64$
20	22	2	$4/22 = .18$
30	22	8	$64/22 = 2.91$
84	78	6	$36/78 = .46$
80	78	2	$4/78 = .05$
70	78	8	$64/78 = .82$
			$6.06 = \chi^2$

c. Report degrees of freedom.

d. Specify the critical value of chi-square at the .05 significance level.

5.99

e. Reject or do not reject the Null Hypothesis.

Reject H_0

f. What is the probability that you have made a Type I error in (e) above? (Be as precise as you can in your answer.)

$.02 < \alpha < .05$

g. What is the probability that you have made a Type II error in (e) above? (Be as precise as you can in your answer.)

$\beta = 0$

h. Make your conclusion precisely in terms of the problem.

The more contact with sick birds, the greater the likelihood of contracting the disease. Just 16% of birds with no contact got the disease, 20% of those with moderate contact did so, but 30% of those with a great deal of contact got sick

(12) 2. Indicate whether each of the following statements is true (T) or false (F) in terms of the above data. If any part of a statement is untrue, it should be marked false (F). Add comments if you wish to clarify your answers.

F a. The statistical unit in this problem is a treatment group.

F b. For this analysis, the six birds that died should be eliminated from the analysis.

F c. The relationship between the independent and dependent variables in the sample can be described as follows:

Birds who did not have contact with sick birds were less likely to contract the disease than to not contract the disease.

T d. The Null Hypothesis for the test of significance in A1 can be stated as follows:

H_o: There is no relationship between contact with sick birds and whether or not chickens contracted the disease.

F e. The Alternative Hypothesis for the above test can be stated as follows:

H_A: The percentages of chickens contracting the disease differ significantly depending upon the their contact with sick birds.

T f. If only 150 chickens had been included in the study and each cell in the table had just half as many cases as in the data presented above, the relationship between these two variables would not have been statistically significant at the .05 level.

(10) B. It has been hypothesized that people nearing death have some conscious or unconscious control over when they die and that such persons will manage to defer death until after significant events occur. To test this hypothesis, the number of deaths from natural causes occurring in County X during the two weeks prior to a major holiday (Christmas) and during the two weeks after that same holiday were recorded. There were 35 deaths during the two weeks preceding Christmas and 65 deaths in the two weeks following Christmas. Based on these data, what can you conclude about the difference between the frequency of deaths occurring before and after Christmas. Use the .05 level to determine statistical significance.

a. Show your work.

	f_o	f_e	$f_o - f_e$	$\lvert f_o - f_e \rvert - .5$	
Before	35	50	15	14.5	$210.25/50 = 4.205$
After	65	50	15	14.5	$210.25/50 = 4.205$
					$\chi^2 \quad 8.410$

$df = 1$

Reject H_0 $\quad .001 < \alpha < .01$

b. Make your conclusion precisely in terms of the problem.

People are sig. more likely to die after Xmas than before the holiday

(32) C. Indicate whether each of the following statements is true (T) or false (F). If any part of a statement is untrue, it should be marked false (F). Add comments, if you wish, to clarify your answers.

F 1. A chi square for contingency tests the statistical significance of the difference between a population and a sample in regard to the distribution of a nominally scaled variable.

F 2. If a chi square calculated for a 3 x 2 contingency table equals 6.52, you would reject the Null Hypothesis and make a Type I error.

F 3. If one cell in a 2 x 2 contingency table has an expected frequency of 2.1, you should combine or delete rows or columns on the table to raise this expected frequency before doing a chi square analysis.

F 4. If a calculated chi-square with 1 degree of freedom equals 5.44 and you reject H_o:

$.02 \leq \alpha \leq .01$

$\beta = 0.$

F 5. The Null Hypothesis for a chi square for a one sample test can (correctly) be stated as follows:

H_o: there is no relationship between the population distribution of a nominally scaled variable and the distribution of that variable in the sampled pop

F 6. A Yates Correction should be used in any chi square where the expected frequencies are less than 5.0.

T 7. When it is correctly used, a Yates Correction never increases the size of a chi square.

F 8. A one sample chi square tests the statistical significance of the relationship between two nominally scaled variables using data from a single sample.

F 9. Phi, V, and Chi-Square are measures of the strength of the relationship between two nominally scaled variables.

T 10. Cramer's V is never negative.

T 11. For the following table V and Phi both equal 1.00.

Performance on Test	Student Status	
	Grad	Undergrad
	--------number of students--------	
A and B	0	10
C and below	20	0

F 12. If V = +1.00, you know that the relationship between the two variables is perfect and positive, i.e., as one increases, the other increases.

T 13. In a one sample chi-square $\Sigma f_o = \Sigma f_e$.

T 14. If the Phi coefficient = 0, then V = 0, and chi-square = 0.

T 15. If two variables are not related at all in the sample, each observed frequency equals its corresponding expected frequency.

F 16. If, in the sample, chi-square = 0, you know that the Null Hypothesis is true.

(20) D. The attached output reports analysis of data from a random sample of Mudville residents. Each sample member was asked whether they intended to do "most" of their holiday shopping this coming season at local stores or "on-line." The following variables were used:

Gender of respondent (gender)

1 Male
2 Female

Shopping Intention for "most" shopping (shop)

1 Local stores
2 On-line

Indicate whether each of the following statements is true (T) or false (F) in terms of this output. If any part of a statement is untrue, it should be marked false (F). Add comments, if you wish, to clarify your answers.

T 1. The statistical unit here is a Mudville resident.

T 2. In the sample, males are more likely than females to say they will do most of their shopping on-line.

F 3. The Null Hypothesis for the testing the statistical significance of the relationship shown on this output can be stated as follows:

H_o: there is no relationship between males and females in whether they intend to shop in local stores or on-line.

F 4. The relationship between "gender" and "shop" in this sample can be described as follows:

Males were more likely to indicate that they intend to do most of their shopping on-line than to say they intend to shop mostly in local stores (70.1% vs. 29.9%)

F 5. About 28% of the males reported that they intended to do "most" of their shopping in local stores while almost 72% of the females reported that they would do so.

T 6. This analysis deals with a 2x2 contingency table and uses a chi square for contingency to test the statistical significance of the relationship.

F 7. Chi-square could correctly be calculated using the figures labeled "% of Total" in each of the cells in the table in place of the observed frequencies.

T 8. If you reject the following Null Hypothesis, $\alpha = .001$.

H_o: there is no relationship in the population between "gender" and "shop."

F 9. If you do not reject the Null Hypothesis of no relationship between these variables, you will make a Type 2 error.

T 10. Cramer's V could be used here to measure the strength of the relationship between gender and "shop."

```
CROSSTABS
  /TABLES=shop  BY gender
  /FORMAT= AVALUE TABLES
  /STATISTIC=CHISQ CC PHI
  /CELLS= COUNT EXPECTED ROW COLUMN TOTAL
  /COUNT ROUND CELL .
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
shop * gender	349	100.0%	0	.0%	349	100.0%

shop * gender Crosstabulation

			gender		
			1.00 Male	2.00 Female	Total
shop	1.00 Local	Count	41	104	145
		Expected Count	56.9	88.1	145.0
		% within shop	28.3%	71.7%	100.0%
		% within gender	29.9%	49.1%	41.5%
		% of Total	11.7%	29.8%	41.5%
	2.00 Online	Count	96	108	204
		Expected Count	80.1	123.9	204.0
		% within shop	47.1%	52.9%	100.0%
		% within gender	70.1%	50.9%	58.5%
		% of Total	27.5%	30.9%	58.5%
Total		Count	137	212	349
		Expected Count	137.0	212.0	349.0
		% within shop	39.3%	60.7%	100.0%
		% within gender	100.0%	100.0%	100.0%
		% of Total	39.3%	60.7%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	12.540[b]	1	.000		
Continuity Correction[a]	11.765	1	.001		
Likelihood Ratio	12.769	1	.000		
Fisher's Exact Test				.001	.000
Linear-by-Linear Association	12.504	1	.000		
N of Valid Cases	349				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 56.92.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.190	.000
	Cramer's V	.190	.000
	Contingency Coefficient	.186	.000
N of Valid Cases		349	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.