

Name: \_\_\_\_\_

Score: \_\_\_\_\_ / \_\_\_\_\_

## Homework 6 (Contingency Tables)

1

A study first reported in JAMA received widespread attention as the first large study of the use of alcohol on American college campuses and was the subject of an article in Time magazine. The researchers surveyed 17,592 students at 140 4-year colleges in 40 states. They found that 1550 respondents were frequent binge drinkers, defined as having had at least 4 (for women) or 5 (for men) drinks at a single sitting at least three times during the previous two week period. Time magazine reported that of the 1550 frequent binge drinkers in the study, 22% reported having had unprotected sex. Find a 95% confidence interval for the true proportion of all frequent binge drinkers who had unprotected sex. The lower limit of this confidence interval is \_\_\_\_\_.

Answer Point Value: 0.0 points

Answer Key: 0.19|0.21

2

The upper limit of this confidence interval is \_\_\_\_\_.

Answer Point Value: 0.0 points

Answer Key: 0.24|0.25

3

Now compute a 95% confidence interval for the proportion of college students who are frequent binge drinkers and who had unprotected sex. The lower limit of this confidence interval is \_\_\_\_\_.

Answer Point Value: 0.0 points

Answer Key: 0.01|0.02

4

The upper limit of this confidence interval is \_\_\_\_\_.

Answer Point Value: 0.0 points

Answer Key: 0.02|0.025

5

Using the two confidence intervals you just computed, write two short news articles (one paragraph long) on the problem of binge drinking and unprotected sex. In the first article, make the situation sound as disastrous as you can. In the second, try to minimize the problem.

Answer Point Value: 0.0 points

Model Short Answer: -----

6

A pilot study in Mexico City compared Cesarean section rates among births to women who used doula support during childbirth to rates among women who did not use doula support. Based on the results of this study, suppose investigators are designing a randomized controlled trial of doula support during labor. Suppose the investigators wish to use  $\alpha=0.05$  and have 80% power for a two-sided test of the hypothesis that Cesarean section rates are the same in both groups. Using Stata for the calculation, how many total women are needed (assuming equal numbers in each group) if researchers anticipate having 2% C-sections in the doula group and 24% in the non-doula group? (These were the estimated proportions from the Mexico City study.) \_\_\_\_ total women are needed.

Answer Point Value: 0.0 points

Answer Key: 90

7

A pilot study in Mexico City compared Cesarean section rates among births to women who used doula support during childbirth to rates among women who did not use doula support. Based on the results of this study, suppose investigators are designing a randomized controlled trial of doula support during labor. Suppose the investigators wish to use  $\alpha=0.05$  and have 80% power for a two-sided test of the hypothesis that Cesarean section rates are the same in both groups. A reviewer of the grant proposal worries that 2% and 24% are unrealistic numbers and would like to see a smaller minimum detectable difference. Using Stata, how many total women are needed (assuming equal numbers in each group) if researchers anticipate having 10% C-sections in the doula group and 18% in the non-doula group? \_\_\_\_ total women are needed.

Answer Point Value: 5.0 points

Answer Key: 638

8

Dale Sandler at the National Institute of Environmental Health Sciences (NIEHS) conducted a study of passive smoking in adulthood and cancer risk. Among 231 non-smoking cancer cases, 120 had passive exposure to tobacco smoke and 111 did not. Among 235 non-smoking controls, 80 had passive exposure to tobacco smoke and 155 did not. The odds ratio for cancer comparing passive smokers to the unexposed is \_\_\_\_.

Answer Point Value: 5.0 points

Answer Key: 2.09|2.1

9

Dr. Dale Sandler at the National Institute of Environmental Health Sciences (NIEHS) conducted a study of passive smoking in adulthood and cancer risk. Among 231 non-smoking cancer cases, 120 had passive exposure to tobacco smoke and 111 did not. Among 235 non-smoking controls, 80 had passive exposure to tobacco smoke and 155 did not. The lower limit of a 95% CI for the odds ratio for cancer comparing passive smokers to the unexposed is \_\_\_\_.

Answer Point Value: 5.0 points

Answer Key: 1.4|1.42

10

Dr. Dale Sandler at the National Institute of Environmental Health Sciences (NIEHS) conducted a study of passive smoking in adulthood and cancer risk. Among 231 non-smoking cancer cases, 120 had passive exposure to tobacco smoke and 111 did not. Among 235 non-smoking controls, 80 had passive exposure to tobacco smoke and 155 did not. The upper limit of a 95% CI for the odds ratio for cancer comparing passive smokers to the unexposed is \_\_\_\_.

Answer Point Value: 5.0 points

Answer Key: 3.09|3.1

11

Suppose we use Fisher's exact test to analyze these data. State the null and alternative hypotheses for a two-sided Fisher's exact test, carry out the test, report the p-value from the test, and interpret the conclusions in terms of passive smoking and cancer risk.

Answer Point Value: 10.0 points

Model Short Answer: -----

12

Researchers in injury prevention conducted a study of 793 bicycle accidents. Of the 147 riders wearing a helmet, 17 suffered a head injury. Of the 646 riders not wearing a helmet, 218 suffered a head injury. Use Fisher's exact test to test the null hypothesis that helmet wearing is not related to head injury. The p-value for this test is



Answer Point Value: 0.0 points

Answer Key: A

13

Researchers in injury prevention conducted a study of 793 bicycle accidents. Of the 147 riders wearing a helmet, 17 suffered a head injury. Of the 646 riders not wearing a helmet, 218 suffered a head injury. Use Fisher's exact test to test the null hypothesis that helmet wearing is not related to head injury. The p-value for this test is



Answer Point Value: 0.0 points

Answer Key: A

14

Describe your conclusion from Fisher's exact test in language suitable for publication in a scientific journal. Be sure to include the proportion of head injuries among helmet wearers and a 95% CI for this proportion, the proportion of head injuries among non-wearers and a 95% CI for this proportion, and the estimated OR for head injury comparing helmet wearers to non-wearers and the estimated 95% CI for the OR.

Answer Point Value: 0.0 points

Model Short Answer: -----

15

Suppose we are interested in determining if there is an association between heart attacks and diabetes in the US Navajo population. We could identify a number of Navajos willing to participate in our study and record the heart attack and diabetes status of each. Then, we could ask whether the proportion of diabetics among those that suffered a heart attack was equal to the proportion of diabetics that did not suffer a heart attack. However, since heart attacks might be relatively rare, we'd need a large sample size. We could instead identify Navajos that we know have had heart attacks. 144 Navajos that had suffered heart attacks were identified and a number of characteristics were recorded (age, gender, smoking status, etc.). Following this, 144 Navajos which matched each of the first 144 on every characteristic except heart attack status were identified.

The pairs were then tested for diabetes. Among the 144 pairs, 9 were both diabetic, 82 were both non-diabetic, 37 had a diabetic heart attack sufferer and non-diabetic control, and 16 had a diabetic control and non-diabetic heart-attack sufferer. Test whether there is an association between heart attacks and diabetes in the US Navajo population. Report the results in a suitable form for publication in a scientific journal (include the test statistic, degrees of freedom, decision to reject or not, and conclusion in terms of the subject matter).

Answer Point Value: 0.0 points

Model Short Answer: -----

16

Consider the attached data from studies of passive smoking and lung cancer risk. Three studies in three separate countries examined lung cancer risk among women as a function of whether their spouse or partner smoked. The estimated OR for cancer comparing those with passive smoking exposure to women without passive smoking exposure in Great Britain is \_\_\_\_\_.

Answer Point Value: 0.0 points

Answer Key: 1.58|1.62

17

This odds ratio is significantly different from zero.

- ☐ True
- ☐ False

Answer Point Value: 0.0 points

Answer Key: False

18

The OR for cancer comparing those with passive smoking exposure to women without passive smoking exposure in the US is \_\_\_\_.

Answer Point Value: 0.0 points

Answer Key: 1.3|1.34

19

This OR is significantly different from zero.

- ☐ True
- ☐ False

Answer Point Value: 0.0 points

Answer Key: False

20

Conduct a test of homogeneity of odds ratios across the three studies. Is it acceptable to combine the OR's according to the test?

- ☐
- ☐

Answer Point Value: 0.0 points

Answer Key: A

21

Suppose it is appropriate to combine the OR's. The estimate of the combined OR is \_\_\_\_.

Answer Point Value: 0.0 points

Answer Key: 1.38|1.4

22

Conduct a test of the null hypothesis that the combined OR=1. Does this test indicate that passive smoking exposure is related to lung cancer risk? Present results in format suitable for journal publication, including the point estimate of the OR and 95% confidence interval as well as an interpretation of the estimated odds ratio.

Answer Point Value: 0.0 points

Model Short Answer: -----

23

Investigators are interested in the relationship between systolic blood pressure and myocardial infarction in two groups: individuals under age 60, and individuals age 60 and older. Conduct a test of homogeneity of odds ratios in the two age groups. Using the most appropriate method (i.e., combining odds ratios if appropriate, and reporting separate odds ratios if not), describe the relationship between systolic blood pressure and myocardial infarction in this population.

Answer Point Value: 0.0 points

Model Short Answer: -----