

STA 6934 – Fall 2001 – Quiz 3

Print Name: _____ **SSN:** _____

1) In a case-control study, the authors report that a 95% confidence interval for the (population) ratio for the odds of having been exposed to power lines among children with leukemia, relative to the odds of having been exposed to power lines among controls who do not have leukemia is (0.70,1.15). Which conclusion is appropriate at the $\alpha = 0.05$ significance level? **4 points**

- a) Conclude that the odds of exposure is higher for children with leukemia than for children without leukemia.
- b) Conclude that the odds of exposure is higher for children without leukemia than for children with leukemia.
- c) Cannot conclude that the odds of exposure differs between the populations of kids with and without leukemia.
- d) The odds of exposure to power lines is between 70% and 115% higher among kids with leukemia than kids without leukemia.

2) A government health administrator is interested whether there is an association between state of residence and whether or not children have health insurance. He samples children from three states (Florida(FL), Texas(TX), and California(CA)), and observes whether the sampled children are covered. He obtains the following table of observed counts.

State	Insured?		Total
	Yes	No	
FL	650	350	1000
TX	820	680	1500
CA	1230	770	2000
Total	2700	1800	4500

- a) What proportion of the children in this study are insured? **3 points**

- b) Under the null hypothesis that the true proportion insured is the same for each state, what is our **expected** count for the number insured in Florida? **4 points**

- c) What is the contribution to the chi-square statistic for insured children in Florida (cell 1) of the table? **5 points**

- d) The overall chi-square statistic for this test is $X_{obs}^2 = 30.07$. Give the rejection region and conclusion for testing whether the probability of being insured is the same (H_0) or differs (H_A) among these three states, based on $\alpha = 0.05$ significance level.
 - i) Reject H_0 in favor of H_A if: _____ **4 points**
 - ii) The population proportions of children insured **are equal/differ** among these three states (circle the correct answer). **2 points**

3) The following table gives systolic blood pressure before and after treatment with a specific drug in a crossover design with eight patients.

Subject	Before	After	D=After-Before
1	132	136	+4
2	160	130	-30
3	145	128	-17
4	140	130	-10
5	154	125	-29
6	136	125	-11
7	134	135	+1
8	132	120	-12

$$\bar{d} = -13.0 \quad s_d = 12.31$$

a) Use the paired t -test to test whether the true mean systolic blood pressures differ between the before and after conditions, by **carefully** completing the following parts:

i) H_0 : H_A : **3 points**

ii) Test Statistic: **7 points**

iii) Rejection Region: **4 points**

iv) Conclude: **3 points**

b) Give the test statistic based on the Wilcoxon Signed Rank test. **5 points**

c) If the rejection region based on the Wilcoxon signed rank test with ($\alpha = 0.05$) is to reject H_0 if $T = \min(T^+, T^-) \leq 4$, what do you conclude and why? **3 points**

d) Based on the previous question, is your P -value **larger** or **smaller** than 0.05? **3 points**

4) On a large cruise ship that forbids vegetarian passengers, 500 passengers order the chicken dinner, and 800 order the prime rib. Among the chicken eaters, 100 suffer a gastrointestinal disaster, while among the prime rib eaters, 20 suffer a gastrointestinal disaster. Treating the passengers on this ship as random samples of all possible people who could be exposed to this batch of chicken and prime rib:

a) What is the estimated risk (probability) of suffering a gastrointestinal disaster among passengers who ate the chicken dinner? **3 points**

b) What is the estimated risk (probability) of suffering a gastrointestinal disaster among passengers who ate the prime rib dinner? **3 points**

c) Give the estimated relative risk for gastrointestinal disaster (for those exposed to chicken, relative to those exposed to prime rib). Give a 95% confidence interval for the true relative risk. **10 points**

d) Based on your previous answer, what is your conclusion (based on $\alpha = 0.05$ significance level)? **3 points**

- i) We cannot conclude that the risk of gastrointestinal disaster differs by meal type.
- ii) Risk of gastrointestinal disaster is higher for those who ate chicken.
- iii) Risk of gastrointestinal disaster is higher for those who ate prime rib.

5) An epidemiologist is interested in studying the relationship between smoking and incidence of diabetes. Further she believes that ethnicity may also be related. She has conducted a large scale cohort study, relating smoking status to diabetes incidence, obtaining odds ratios separately by ethnicity (thus controlling for ethnicity). She has used: **3 points**

- a) Fisher's Exact Test
- b) Kruskal-Wallis Test
- c) Mantel-Haenszel Test