

Some Study Questions for Final Exam

1. The following table presents the results of a study examining student attitudes concerning traits they find desirable in mothers. Results are presented separately for male and female student respondents.

Being a College Graduate	Sex of Respondent		Total
	Male	Female	
Mentioned	26	16	42
Not Mentioned	343	407	750
Total	369	423	792

Test the hypothesis that the gender of a respondent is independent of whether or not the respondent believes a college education is important in a mother. Use a 10% significance level.

2. The following table relates survival of infants to the amount of prenatal care received for 715 mothers:

Amount of Prenatal Care	Infants' Survival		Total
	Died	Survived	
Less	20	373	393
More	6	316	322
Total	26	689	715

Test the hypothesis that infant survival is independent of the amount of prenatal care received by the mother. Use a 1% significance level.

3. In a study of uni-polar depression in married couples, 25 couples with a history of uni-polar depression in both partners were studied. Each individual in the study was examined by a psychiatrist and classified into one of the following four categories: mild, moderate, severe, or profound depression. The data are as follows:

Couple No.	Level of Depression	
	Husband	Wife
1	Mild	Moderate
2	Mild	Severe
3	Mild	Mild
4	Moderate	Mild
5	Moderate	Profound
6	Moderate	Moderate
7	Moderate	Mild
8	Mild	Profound
9	Mild	Severe
10	Severe	Severe
11	Severe	Profound
12	Severe	Mild
13	Severe	Severe
14	Moderate	Severe
15	Moderate	Moderate
16	Moderate	Profound
17	Moderate	Mild
18	Severe	Mild
19	Profound	Severe
20	Moderate	Severe
21	Mild	Mild
22	Mild	Moderate
23	Moderate	Mild
24	Severe	Profound
25	Mild	Severe

Suppose that we decide to simplify the diagnosis categories so that “Severe” and “Profound” are categorized as “Depressed” and “Mild” and “Moderate” are categorized as “Not Depressed”.

- a. Based on this simplified categorization, what is the appropriate statistical test to test the hypothesis that the probability of being “Depressed” is the same for husbands as it is for wives?
 - b. Construct a contingency table appropriate for conducting McNemar’s test on these data..
 - c. Test the null hypothesis that the probability of depression among such couples is the same for husband and wife using McNemar’s test. Use a 5% significance level.
 - d. Is there any reason to be concerned over the use of McNemar’s test in this problem? Why or why not, and if there is reason to be concerned, suggest an alternative test.
4. In a study of depression and electro-convulsive therapy (ECT), 65 patients with uni-polar depression that was described as either “Severe” or “Profound” prior to treatment were given ECT. It was found that 14 patients received the same assessment (severe or profound) before and after ECT, 28 received a milder assessment after ECT, and 23 patients received more severe assessment following ECT.

- a. Use McNemar's at a significance level of 10% to test the null hypothesis that ECT has no effect on the severity of depression among patients of the type studied here.
 - b. Estimate the ratio of the odds of being profoundly depressed before ECT over the odds of being profoundly depressed after ECT, and place a 90% confidence interval around this quantity.
5. To study the role of genetics in heart disease (HD) the medical histories of 100 randomly selected deceased men were examined. In addition, the medical records of the fathers of these men were examined. From these records the following information was gathered:

Son	Father		Total
	HD	No HD	
HD	15	12	27
No HD	18	55	73
Total	33	67	100

Test the hypothesis that the probability of HD is the same among fathers and sons at the 10% significance level.

6. In a study of respiratory illness a sample of 187 children whose mothers smoked were followed over time as they aged from 7 to 10 years of age. The following table summarizes their respiratory illness status (wheeze, no wheeze) at ages 7 and 10:

Age 7	Age 10		Total
	Wheeze	No Wheeze	
Wheeze	13	18	31
No Wheeze	13	143	156
Total	26	161	187

- a. Test the hypothesis that the probability of wheezing is the same at ages 7 and 10 at the 5% significance level. Perform the test using an approximate method.
 - b. Estimate the odds ratio comparing the odds of wheezing at age 7 to the odds of wheezing at age 10 and place a 95% confidence interval around this quantity.
7. Suppose that the probability that a child born to a woman 40 years of age or older has Down's Syndrome is 0.0086. Of 1000 women aged 40 years and above, 21 gave birth to children with Down's Syndrome. Is this unusually high?
8. As part of a survey of public opinion concerning national politics, in October, 1993, each member of a random sample of 550 Americans was asked whether or not he/she approved of the job that Bill Clinton is doing as President. Of the 550 respondents, 210 people said that they approved of Bill Clinton's performance as president. Find an approximate 90% confidence interval for the true percentage of the U.S. population that approves of Bill Clinton's performance.

9. Refer to the previous problem. Suppose that in October, 1994 each member of another random sample of 650 Americans was asked whether or not he/she approved of Bill Clinton's performance as President. In this sample 302 people expressed approval of Clinton's performance. Test whether or not Clinton's approval ratings changed between 1993 and 1994. Use a 5% significance level.