60080079 Introduction to Statistical Methods
Semester 2 2023-2024
Homework Assignment 8

21 CST H3Art

1 It is traditional practice in Egypt to withhold food from children with diarrhea. Because it is known that feeding children with this illness reduces mortality, medical authorities undertook a nationwide program designed to promote feeding sick children. To evaluate the impact of the program, surveys were taken before and after the program was implemented. In the first survey, 457 of 1003 surveyed mothers followed the practice of feeding children with diarrhea. For the second survey, 437 of 620 surveyed followed this practice.

a) Assume that the data come from two independent samples. Test the hypothesis that the program was effective, that is, the practice of feeding children with diarrhea increased between the time of the first study and the time of the second. State H_0 and H_A, give the test statistic and its p-value, and summarize your conclusion.

b) Present the data in a two-way table. Can the c^2 statistic test your hypotheses?

c) Describe the results using a 95% confidence interval for the difference in proportions.

1.1 The null hypothesis is H_0: $p_1 = p_2$ whereas the alternative is ____.
1) H_A: $p_1 < p_2$
2) H_A: $p_1 \neq p_2$
3) H_A: $p_1 > p_2$

1.2 The pooled proportion is 0._508 and its standard error is 0._254.
1) 0
2) 1
3) 3
4) 5

Answer: 141

1.3 The computed $Z = $ -_.807 and a p-value close to ____. There is a strong evidence that the rate of feeding went ____ by the second survey.
1) 8; 0; up
2) 8; 1; down
3) 9; 0; up
4) 9; 1; down

Answer: 3

1.4 For the 2×2 table, the entry for number of children not fed in the second survey is _83. Because of the alternative, we ___ use the χ^2-test.
1) 1; can
2) 1; cannot
3) 2; can
4) 2; cannot

1.5 The standard error of the difference is 0._241, and a 95% CI for difference of the proportions ranges from 0.2019 to 0._965.
1) 0; 2
2) 0; 3
3) 1; 2
4) 1; 3

Answer: 21

2 To be competitive in global markets, many U.S. corporations are undertaking major reorganizations. Often these involve "downsizing," sometimes called a "reduction in force," (RIF), where substantial numbers of employees are terminated. Federal and various state laws require that employees be treated equally regardless of their age. In particular, employees over the age of 40 years are in a "protected" class, and many allegations of discrimination focus on comparing employees over 40 with their younger coworkers. Here are the data for a recent RIF:

Terminated	≤ 40	>40
Yes	16	82
No	585	771

Perform the chi-square test for this two-way table. Give the test statistic, the degrees of freedom, the p-value, and your conclusion.

2.1 H_0: Termination is ___ of age group. The expected frequencies for terminated employees over 40 is 5_.4924.
1) independent; 7
2) independent; 8
3) not independent; 7
4) not independent; 8

Answer: 1

2.2 The computed χ^2 is 2_.1009. Comparing to a χ^2 with $df =$___, the p-value is close to 0.
1) 6; 1
2) 6; 3
3) 7; 1
4) 7; 3

2.3 We ___ the null, and conclude that termination rates were ___ for the two age groups.
1) retain; the same
2) retain; not the same
3) reject; the same
4) reject; not the same

Part II: Write your number as a two-digit number.

Answer: 34

3   Following complaints about the working conditions in some apparel factories both in the United States and abroad, a joint government and industry commission recommended in 1998 that companies that monitor and enforce proper standards be allowed to display a "No Sweat" label on their products. Does the presence of these labels influence consumer behavior? A survey of U.S. residents aged 18 or older asked a series of questions about how likely they would be to purchase a garment under various conditions. For some conditions, it was stated that the garment had a "No Sweat" label; for others, there was no mention of such a label. On the basis of the responses, each person was classified as a "label user" or a "label nonuser." There were 296 women surveyed. Of these, 63 were label users. On the other hand, 27 of 251 men were classified as users.

a) Construct the 2´2 table of counts for this problem. Include the marginal totals.
b) Use a c^2 statistic to examine the question of whether or not there is a relationship between gender and use of No Sweat labels. Give the test statistic, degrees of freedom, the p-value, and your conclusion.
c) You examined this question using a different method in Problem 5. Verify that if you square the Z-statistic you calculated for that problem, you obtain the c^2-statistic that you calculated for this problem.

3.1 Table ___ is the correct crosstabulation of gender and use.

1)

	W	M	Total
User	63	27	90
Non	233	224	457
Total	296	251	547

2)

	W	M	Total
User	224	27	251
Non	233	63	296
Total	457	90	547

3)

	W	M	Total
User	63	233	296
Non	27	224	251
Total	90	457	547

3.2 The χ^2-statistic is 10._49, and the *df* is ___.
1) 1
2) 3
3) 5
4) 7
5) 9

Answer: 151

3.3 This will have a p-value between .0005 and 0.00_. We can conclude that there ___ relationship between gender and use.
1) 0
2) 1
3) 2
4) is no
5) is a

Answer: 25

4 (SPSS Exercise) A recent study of 865 college students found that 42.5% had student loans. The students were randomly selected from the approximately 30,000 undergraduates enrolled in a large public university. The purpose of the study was to examine the effects of student loan burdens on the choice of a career. A student with a large debt may be more likely to choose a field where starting salaries are high so that the loan can more easily be repaid. The following table classifies the students by field of study and whether or not they have a loan:

	Student Loan	
Field of Study	Yes	No
Agriculture	32	35
Child development and family studies	37	50
Engineering	98	137
Liberal arts and education	89	124
Management	24	51
Science	31	29
Technology	57	71

Using these data, find the computer χ^2-statistic and the exact p-value. What can you conclude?

9. 1 The computed χ^2 is 6._ _5, and the p-value is 0._ _7.

1) 1
2) 2
3) 3
4) 4
5) 5
6) 6

Answer: 5236

9.2 The $df =$ ___. We can conclude that student loan is ___ the career choice.
1) 5
2) 6
3) 7
4) independent of
5) related to

Answer: 24