

WebAssign

Topic Five Homework (Homework)

Current Score : - / 18

Due : Sunday, March 25 2018 11:59 PM MST

LISA KNIGHT SMITH
MAT 274, section 0501, Spring 2018
Instructor: Irene Tsapara

1. -/2 points Mintros19 9.E.504.XP.

For each of the following situations give the degrees of freedom and an appropriate bound on the P-value (give the exact value if you have software available) for the χ^2 statistic for testing the null hypothesis of no association between the row and column variables.

(a) A 2 by 2 table with $\chi^2 = 0.89$.

df =

P-value =

(b) A 4 by 4 table with $\chi^2 = 18.53$.

df =

P-value =

(c) A 2 by 8 table with $\chi^2 = 23.6$.

df =

P-value =

(d) A 5 by 3 table with $\chi^2 = 12.76$.

df =

P-value =

A recent study of undergraduates looked at gender differences in dieting trends. There were 187 women and 104 men who participated in the survey. The table below summarizes whether a student tried a low-fat diet or not by gender:

Gender		Tried low-fat diet	
	Women	Men	
Yes	36	7	
No			

(a) Fill in the missing cells of the table.

Gender		Tried low-fat diet	
	Women	Men	
Yes	36		
No			

(b) Summarize the data numerically. What percent of each gender has tried low-fat diets? (Round your answers to two decimal places.)

women %
men %

(c) Test that there is no association between gender and the likelihood of trying a low-fat diet. (Round your χ^2 to three decimal places, and round your P-value to four decimal places.)

$\chi^2 =$
df =
P-value =

Summarize the results.

- There is strong evidence at the 5% level that gender and the likelihood of trying a low-fat diet are related.
- There is no evidence at the 5% level that gender and the likelihood of trying a low-fat diet are related.

In what ways do advertisers in magazines use sexual imagery to appeal to youth? One study classified each of 1500 full-page or larger ads as "not sexual" or "sexual," according to the amount and style of the dress or the male or female model in the ad. The ads were also classified according to the age group of the intended readership. Here is a summary of the data.

Magazine readership age group	Model dress	
	Young adult	Mature adult
Number of ads	1000	500
	Sexual (percent)	Sexual (percent)
	27.4%	24.4%
	Not sexual (percent)	Not sexual (percent)
	72.6%	75.6%

Perform the significance test that compares the model dress for the age groups of magazine readership. Summarize the results of your test. (Use $\alpha = 0.05$. Round your χ^2 to three decimal places and your P -value to four decimal places.)

$\chi^2 =$

P -value =

Give your conclusion.

- Reject the null hypothesis. There is significant evidence of an association between model dress and age group.
- Fail to reject the null hypothesis. There is not significant evidence of an association between model dress and age group.
- Reject the null hypothesis. There is significant evidence of an association between model dress and age group.
- Fail to reject the null hypothesis. There is significant evidence of an association between model dress and age group.
- Fail to reject the null hypothesis. There is not significant evidence of an association between model dress and age group.

A study of identity theft looked at how well consumers protect themselves from this increasingly prevalent crime. The behaviors of 63 college students were compared with the behaviors of 59 nonstudents. One of the questions was "When asked to create a password, I have used either my mother's maiden name, or my pet's name, or my birth date, or the last four digits of my social security number or a series of consecutive numbers." For the students, 23 agreed with this statement while 28 of the nonstudents agreed.

(a) Display the data in a two-way table.

	Students	Nonstudents	Total
Agreed			
Disagreed			
Total			122

Perform the chi-square test. (Round your χ^2 to three decimal places and round your P-value to four decimal places.)

$\chi^2 =$

df =

P-value =

Summarize the results.

- We cannot conclude at the 5% level that students and nonstudents differ in the response to this question.
- We can conclude at the 5% level that students and nonstudents differ in the response to this question.

(b) Reanalyze the data using the methods for comparing two proportions that we studied in the previous chapter. Compare the results and verify that the chi-square statistic is the square of the z statistic. (Test students who agreed minus nonstudents who agreed. Round your z to two decimal places and round your P-value to four decimal places.)

z =

P-value =

(c) The students in this study were junior and senior college students from two sections of a course in Internet marketing at a large northeastern university. The nonstudents were a group of individuals who were recruited to attend commercial focus groups on the West Coast conducted by a lifestyle marketing organization. Discuss how the method of selecting the subjects in this study relates to the conclusions that can be drawn from it.

This answer has not been graded yet.

Suppose that there is a linear relationship between the number of students in a school system and the annual budget. Write a population regression model to describe this relationship.

$Y_i = \beta_0 + \beta_1 X_i + \beta_2 X_i^2 + \epsilon_i$

$Y_i = \beta_0 + \beta_1 X_i + \epsilon_i$

$Y_i = \beta_0 + \beta_1 X_i$

$\hat{Y} = \beta_0 + \beta_1 X_i + \epsilon_i$

$\hat{Y} = \beta_0 + \beta_1 X_i$

(a) Which parameter in your model is the fixed cost in the budget (for example, the salary of the principals and some administrative costs) that does not change as increases?

β_1

ϵ_i

β_0

b_1

b_0

(b) Which parameter in your model shows how total cost changes when there are more students in the system?

β_1

ϵ_i

b_0

b_1

β_0

Do you expect this number to be greater than 0 or less than 0?

greater than 0

less than 0

(c) Actual data from various school systems will not fit a straight line exactly. What term in your model allows variation among schools of the same size X_i ?

β_0

b_0

The SAT and the ACT are the two major standardized tests that colleges use to evaluate candidates. Most students take just one of these tests. However, some students take both. The data [data296.dat](#) gives the scores of 60 students who did this. How can we relate the two tests?

(a) Plot the data with SAT on the x axis and ACT on the y axis. Describe the overall pattern and any unusual observations.

(b) Find the least-squares regression line and draw it on your plot. Give the results of the significance test for the slope. (Round your regression slope and intercept to three decimal places, your test statistic to two decimal places, and your P-value to four decimal places.)

$$\text{ACT} = \boxed{} + \boxed{} (\text{SAT})$$

$$t = \boxed{}$$

$$P = \boxed{}$$

(c) What is the correlation between the two tests? (Round your answer to three decimal places.)

- b_1
- ϵ_1
- β_1

Returns on common stocks in the United States and overseas appear to be growing more closely correlated as economies become more interdependent. Suppose that the following population regression line connects the total annual returns (in percent) on two indexes of stock prices:

$$\text{MEAN OVERSEAS RETURN} = -0.09 + 0.30 \times \text{U.S. RETURN}$$

(a) What is β_0 in this line?

- β_0 is the population intercept, -0.09.
- β_0 is the population slope, 0.30.
- β_0 is the population slope, -0.09.
- β_0 is the population intercept, 0.30.

What does this number say about overseas returns when the U.S. market is flat (0% return)?

This says that the mean overseas return is % when the U.S. return is 0%.

(b) What is β_1 in this line?

- β_1 is the population slope, -0.09.
- β_1 is the population slope, 0.30.
- β_1 is the population intercept, -0.09.
- β_1 is the population intercept, 0.30.

What does this number say about the relationship between U.S. and overseas returns?

This says that when the U.S. return changes by 1%, the mean overseas return changes by %.

(c) We know that overseas returns will vary in years when U.S. returns do not vary. Write the regression model based on the

population regression line given above.

$y_i = \square + \square x_i + \varepsilon_i$, where y_i and x_i are observed overseas and U.S. returns in a given year, and ε_i are independent $N(0, \sigma)$ variables.

What part of this model allows overseas returns to vary when U.S. returns remain the same?

- x_i
- σ_i
- ε_i
- y_i

8. -/2 points IntroStat9 10.E.031.

How are returns on common stocks in overseas markets related to returns in one countries markets? Consider measuring the countries returns by the annual rate of return on the index A and overseas returns by the annual rate of return on index B. Both are recorded in percents. We will regress the B returns on the A returns for 21 years. Here is part of the output for this regression. The regression equation is $B = -3.25 + 0.823A$. Complete the analysis of variance table by filling in the missing boxes. (Round your answer for F to two decimal places and your answers for SS and MS to one decimal place.)

Analysis of Variance

Source	DF	SS	MS	F
Regression	1	5551.3		
Residual Error		10077.5		
Total				

We assume that our wages will increase as we gain experience and become more valuable to our employers. Wages also increase because of inflation. By examining a sample of employees at a given point in time, we can look at part of the picture. How does length of service (LOS) relate to wages? The data here ([data272.dat](#)) is the LOS in months and wages for 60 women who work in Indiana banks. Wages are yearly total income divided by the number of weeks worked. We have multiplied wages by a constant for reasons of confidentiality.

(a) Plot wages versus LOS. Consider the relationship and whether or not linear regression might be appropriate. (Do this on paper. Your instructor may ask you to turn in this graph.)

(b) Find the least-squares line. Summarize the significance test for the slope. What do you conclude?

$$\text{Wages} = \boxed{} + \boxed{} \text{LOS}$$

$$t = \boxed{}$$

$$P = \boxed{}$$

(c) State carefully what the slope tells you about the relationship between wages and length of service.

This answer has not been graded yet.

(d) Give a 95% confidence interval for the slope.
 (,)