

HW E15: Test for Independence

Score: 0/8 0/8 answered

● Question 1



The purpose of a Chi-Square test of Independence is to

- examine the relationship between an explanatory categorical variable and a response quantitative variable
- examine the relationship between an explanatory quantitative variable and a response categorical variable
- examine relationships between two categorical variables.
- examine relationships between two quantitative variables.
- None of the above are true

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● Question 2 < >

You intend to conduct a test of homogeneity for a contingency table with 8 categories in the column variable and 6 categories in the row variable. You collect data from 1069 subjects.

What are the degrees of freedom for the χ^2 distribution for this test?

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● Question 3 < >

At a stop sign, some drivers come to a full stop, some come to a 'rolling stop' (not a full stop, but slow down), and some do not stop at all. We would like to test if there is an association between gender and type of stop (full, rolling, or no stop). We collect data by standing a few feet from a stop sign and taking note of type of stop and the gender of the driver. What are the hypotheses for testing for an association between gender and type of stop?

- H0: Males and females are equally likely to come to a full stop. HA: Males and females are not equally likely to come to a full stop.
- H0: Gender and type of stop are associated. HA: Gender and type of stop are independent.
- H0: Gender and type of stop are independent. HA: Gender and type of stop are associated.
- H0: Males and females are equally likely to come to a rolling stop. HA: Males are more likely than females to come to a rolling stop.

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● Question 4



At a stop sign, some drivers come to a full stop, some come to a 'rolling stop' (not a full stop, but slow down), and some do not stop at all. We would like to test if there is an association between gender and type of stop (full, rolling, or no stop). We collect data by standing a few feet from a stop sign and taking note of type of stop and the gender of the driver. Below is a contingency table summarizing the data we collected.

	Male	Female
Full stop	6	6
Rolling stop	16	15
No stop	4	3

If gender is not associated with type of stop, how many males would we expect to not stop at all?

- 6.24
- 5.76
- 3.64
- 3.36

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● Question 5 < >

At the beginning of a semester an anonymous survey was conducted on students in a statistics class. Two of the questions on the survey were about gender and whether or not students have equal, more, or less energy in the afternoon compared to the morning. Below are the results.

	Equal	Less	More
Female	18	37	24
Male	9	15	23

What test should we perform to see if gender and energy level are associated?

- Chi-square test of independence
- Chi-square test of goodness of fit
- Comparing two proportions
- Comparing two means

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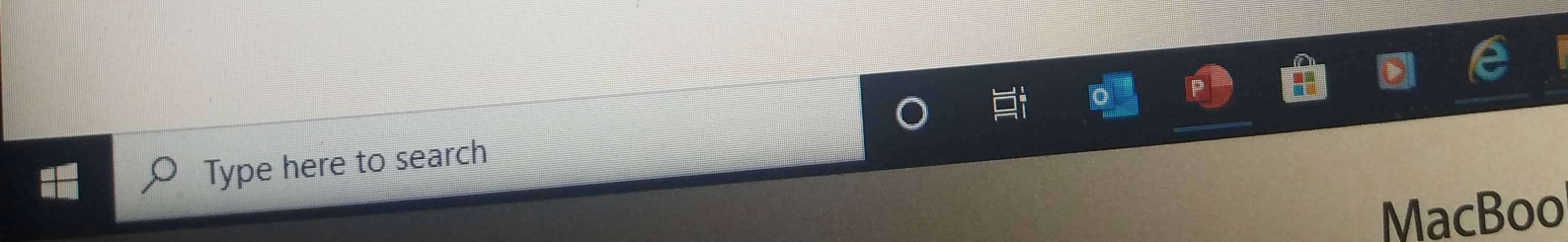
● Question 6 < >

Rock-paper-scissors is a hand game played by two or more people where players choose to sign either *rock*, *paper*, or *scissors* with their hands. We would like to test if players choose between these three options randomly, or if certain options are favored above others. What hypothesis test should we conduct to answer this research question?

- Compare two proportions
- Chi square test of independence
- Chi square test of goodness of fit
- Compare two means

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● Question 7



6.36 Diabetes and unemployment: A 2012 Gallup poll surveyed Americans about their employment status and whether or not they have diabetes. The survey results indicate that 1.5% of the 47,774 employed (full or part time) and 2.5% of the 5,855 unemployed 18-29 year olds have diabetes.

(a) Create a two-way table presenting the results of this study.

	Diabetes	No Diabetes
Employed		
Unemployed		

(b) State appropriate hypotheses to test for independence of incidence of diabetes and employment status.

- H_0 : Diabetes status and employment status are independent
 H_a : Diabetes status and employment status are not independent
- H_0 : $\mu_{\text{diabetes}} = \mu_{\text{employed}}$
 H_a : $\mu_{\text{diabetes}} \neq \mu_{\text{employed}}$
- H_0 : Diabetes status and employment status are dependent
 H_a : Diabetes status and employment status are not dependent

(c) The sample difference is about 1%. If we completed the hypothesis test, we would find that the p-value is very small (about 0), meaning the difference is statistically significant. Use this result to explain the difference between statistically significant and practically significant findings.

- If our data don't provide strong enough evidence to reject the null hypothesis we should just collect more data until we can report the results that we want
- Since the sample sizes are so large and the difference between the two sample proportions is so small, we observe a statistically significant difference which may not be practically significant
- Being unemployed causes people to get diabetes at a higher rate

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Question 8

6.34 Prenatal vitamins and Autism: Researchers studying the link between prenatal vitamin use and autism surveyed the mothers of a random sample of children aged 24 - 60 months with autism and conducted another separate random sample for children with typical development. The table below shows the number of mothers in each group who did and did not use prenatal vitamins during the three months before pregnancy (periconceptual period). (Schmidt, 2011)

	Autism	Typical Development	Total
No vitamin	111	70	181
Vitamin	143	159	302
Total	254	229	483

(a) State appropriate hypotheses to test for independence of use of prenatal vitamins during the three months before pregnancy and autism.

- $H_0: p_{\text{vitamin}} = p_{\text{no vitamin}}$
 $H_a: p_{\text{vitamin}} > p_{\text{no vitamin}}$
- $H_0: p_{\text{vitamin}} = p_{\text{no vitamin}}$
 $H_a: p_{\text{vitamin}} \neq p_{\text{no vitamin}}$
- $H_0: p_{\text{vitamin}} = p_{\text{no vitamin}}$
 $H_a: p_{\text{vitamin}} < p_{\text{no vitamin}}$

(b) Complete the hypothesis test and state an appropriate conclusion.

What is the value of the test statistic for this test? (Please round to two

decimal places) What is the p-value associated with this test? (Please round to

four decimal places) The result of the hypothesis is:

- Since $p < \alpha$ we fail to reject the null hypothesis
- Since $p \geq \alpha$ we accept the null hypothesis
- Since $p < \alpha$ we reject the null hypothesis and accept the alternative
- Since $p \geq \alpha$ we do not have enough evidence to reject the null hypothesis
- Since $p \geq \alpha$ we reject the null hypothesis and accept the alternative

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