Psychology 400-3003
Psychological Statistics
Spring 2015- Chi Square Practice
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CORRECT ANSWERS BOLDED

1. The expected frequencies _____.
   a. are always whole numbers
   b. can contain fractions or decimal values
   c. can contain both positive and negative values
   d. can contain fractions and negative numbers

2. Ten years ago, only 15% of the U.S. population consisted of people more than 65 years old. A researcher plans to use a sample of $n = 300$ people to determine whether the population distribution has changed during the past ten years. If a chi-square test is used to evaluate the data, what is the expected frequency for the older-than-65 category?
   a. 15
   b. 30
   c. 45
   d. 150

3. A large value for the chi-square statistic indicates
   a. the sample data (observed values) do not match the null hypothesis
   b. there is a good fit between the sample data (observed values) and the null hypothesis
   c. the observed values from the sample data are consistently larger than the expected values
   d. the observed values from the sample data are consistently smaller than the expected values

4. The null hypothesis for the chi-square test for independence states that _____.
   a. there is a relations between the two variables
   b. there is no relation between the two variables
   c. both variables have the same frequency count
   d. the two variables have different frequency counts

5. A basic assumption for a chi-square hypothesis test is _____.
   a. the population distribution(s) must be normal
   b. the scores must come from an interval or ratio scale
   c. the observations must be independent
   d. All of the other choices are assumptions for chi-square.

6. A researcher is examining the relation between color preferences and gender. A sample of 30 men and 30 women is obtained, and each person is asked to identify his/her preference between two choices of paint colors for a new student lounge. For this sample, 5 of the men preferred color A, and 15 of the women preferred color A. If a chi-square test is used to evaluate the relationship, what is the df value for the chi-square statistic?
   a. 1
   b. 3
   c. 57
   d. 59

7. For a fixed *a* level, how is the critical value for chi-square related to the size of the sample?
   a. As the sample size increases, the critical value also increases.
   b. As the sample size increases, the critical value decreases.
   c. The critical value of chi-square is not related to the sample size.

8. Explain how the chi-square tests differ from parametric tests (such as t tests or ANOVA) with respect to the hypotheses, the data, and the assumptions underlying the test.

As nonparametric tests, the chi-square tests state general hypotheses about the entire population without any reference to a specific population parameter. The data for a chi-square test consist of frequencies, but the data for a t test or ANOVA consist of scores that can be added, multiplied, squared, etc. Finally, the chi-square tests do not require any assumptions about population parameters. The t tests and ANOVA require normal populations and homogeneity of variance for tests with independent-measures designs.

9. The college is planning to add a food vender in the student union and would like to know what type of food service the students would prefer. A sample of 120 students is obtained and each student is asked to select his/her preference from a coffee shop, a pizza place, or a hamburger grill. The resulting frequency data are as follows:

Coffee	Pizza	Hamburger
53	37	30

Do the data indicate any significant preferences among the three types of food service?

ANSWER

The null hypothesis states that the three food venders are equally preferred in the population (p = 1/3 for each).

The expected frequency is 40 for each category and chi-squared = 6.95. With df = 2, the critical value is 5.99. Reject the null hypothesis, there are significant preferences.

10. A researcher would like to know whether there is a consistent, predictable relation between verbal skills and math skills for high school students. A sample of 200 students is obtained and each student is given a standardized English test and a standardized math test. Based on the test results, students are classified as high or low for verbal skills and for math skills. The results are summarized in the following frequency distribution:

	Verbal Skills: High	Verbal Skills: Low
High Math	50	30
Low Math	50	70

Based on these results, can the researcher conclude that there is a significant relation between verbal skills and math skills?

ANSWER

a. The null hypothesis states that there is not a significant relation between verbal skills and math skills. With alpha = .05 and *df* = 1, the critical value is 3.84. The expected frequencies are as follows:

	Verbal Skills: High	**Verbal Skills: Low**
High Math	**40**	**40**
Low Math	**60**	**60**

For these data, chi-squared = 8.33. Reject H_0. The data indicate a significant relation between math skills and verbal skills.

The phi-coefficient is 0.204.

11. A researcher is interested in the relation between birth order and personality. A sample of $n = 100$ people is obtained, all of whom grew up in families as one of three children. Each person is given a personality test and the researcher also records the person's birth order position (1st born, 2nd, or 3rd). The frequencies from this study are shown in the following table. On the basis of these data can the researcher conclude that there is a significant relation between birth order and personality? Test at the .05 level of significance.

	Birth Position		
	1st	2nd	3rd
Outgoing	13	31	16
Reserved	17	19	4

ANSWER

The null hypothesis states that there is no relation between birth order and personality - the two variables are independent. With *df* = 2, the critical value for this test is 5.99. The expected frequencies are as follows:

	Birth Position		
	1st	**2nd**	**3rd**
Outgoing	**18**	**30**	**12**
Reserved	**12**	**20**	**8**

For these data, the chi-square statistic is 6.89. Reject H_0 and conclude that there is a significant relation between personality and birth order.