INDEPENDENCE AND CORRELATION HOMEWORK TEXT: 11.3, 12.4

LAST NAME	FIRST NAME	DATE

1. A Chi-squared test for independence applied to a contingency table with 4 columns and 3 rows yields the test statistic $\chi_0^2 = 10$. Compute the p-value for this test.

2. A Chi-squared test for independence applied to a contingency table with 5 columns and 2 rows yields the test statistic $\chi_0^2 = 1.6$. Compute the p-value for this test.

Ornithologists, scientists who study birds, tag sparrow hawks in 13 different colonies to study their population. They gather data for the percent of new sparrow hawks in each colony and the percent of those that have returned from migration. Of interest is the strength of the linear correlation between the two percentages.

Percent return	74,	66,	81,	52,	73,	62,	52,	45,	62,	46,	60,	46,	38
Percent new	5,	6,	8,	11,	12,	15,	16,	17,	18,	18,	19,	20,	20

3. State the null and the alternative hypotheses for your test.

4. Find a point estimate for the population linear correlation coefficient.

5. Find the p-value for this test.

6. State the conclusion of your test if you were using $\alpha = 0.02$ level of significance.

A poll is conducted among 668 adults in which the subjects are asked whether they agree that the government should prohibit smoking in public places. In addition, each person was asked how many people live in their household. The results are summarized below.

	1	**2**	**3**	**4**	**5**
Agree	73	109	48	37	37
No Opinion	31	52	29	20	18
Disagree	42	71	38	40	23

Test whether the opinion about smoking in public places is dependent on the number of people in a household. Use 99% confidence level.

7. State the null and the alternative hypotheses for your test.

8. Find a point estimate for the population linear correlation coefficient.

9. Find the p-value for this test.

10. State the conclusion of your test if you were using $\alpha = 0.02$ level of significance.

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11. A two-tailed test for correlation based on a sample of size $n = 35$ yields the test statistic $t_0 = 2.71$. Find the p-value of this test.

12. A two-tailed test for independence based on a contingency table with 4 rows and 5 columns yields a test statistic $\chi_0^2 = 6.28$. Find the p-value of this test.

Are streets where cars travel faster noisier than the streets where cars travel slower? The following table present the average speeds in km/hr and the corresponding noise levels in decibels.

Speed	28,	36,	39,	29,	30,	30,	29,	33
Noise	78.1,	79.6,	81.0,	78.7,	78.6,	78.5,	78.4,	79.6

Use 99.9% confidence level to test whether the noise level is linearly correlated with the average speed.

13. Find the equation of the linear regression line for predicting the noise level given the average speed.

14. State the null and the alternative hypotheses for your test.

15. Find a point estimate for the population linear correlation coefficient.

16. Find the p-value for this test.

17. State the conclusion of your test if you were using $\alpha = 0.02$ level of significance.

ANSWERS

1. 0.124652

3. $H_0 : \rho = 0, \quad H_1 : \rho \neq 0, \quad$ using two-tailed Pearson t test for correlation

5. 0.003248

7. H_0 : Independent, $\quad H_1$: Dependent, $\quad$ using Pearson chi-squared test.

9. 0.605

11. 0.01058957

13. $N = 0.2347 \times S + 71.6123$

15. 0.9648084

17. There is sufficient evidence for strong linear correlation between the average speed and the noise level on a street.