

Multiple Choice

1. When calculating the degrees of freedom when doing inference for linear regression, we use:
 - a. $DF = n - 1$
 - b. $DF = n - 2$
 - c. $DF = n + 1$
 - d. $DF = n + 2$
 - e. $DF = n - 4$

2. Looking at an Minitab output, where can you find the slope of the regression line?
 - a. Coef column, Constant row
 - b. Coef column, Variable row
 - c. SE Coef column, Constant row
 - d. SE Coef column, Variable row
 - e. T column, Constant row

3. Looking at an Minitab output, where can you find the y-intercept of the regression line?
 - a. Coef column, Constant row
 - b. Coef column, Variable row
 - c. SE Coef column, Constant row
 - d. SE Coef column, Variable row
 - e. T column, Constant row

4. When using the acronym LINER to check conditions for regression inference, the letters stand for:
 - a. L: Linear, I: Independent, N: Normal, E: Equal sample size, R: Random
 - b. L: Linear, I: Independent, N: Normal, E: Equal SD, R: Random
 - c. L: Linear, I: Individual, N: Normal, E: Equal sample size, R: Random
 - d. L: Linear, I: Individual, N: Normal, E: Equal SD, R: Random
 - e. None of the above

5. When analyzing survey results from a two-way table, the main distinction between a test for independence and a test for homogeneity is
 - a. How the degrees of freedom are calculated
 - b. How the expected counts are calculated
 - c. The number of samples obtained
 - d. The number of rows in the two-way table
 - e. The number of columns in the two-way table

Free Response

6. Biologists wish to cross pairs of tobacco plants having genetic makeup Gg, indicating that each plant has one dominant gene (G) and one recessive gene (g) for color. Each offspring plant will receive one gene for color from each parent. The Punnett square below shows the possible combinations of gene received by the offspring:

		Parent 2 passes on:	
		G	g
Parent 1 passes on:	G	GG	Gg
	g	Gg	gg

The Punnett square suggests that the expected ratio of green (GG) to yellow-green (Gg) to albino (gg) tobacco plants should be 1:2:1. In other words, the biologists predict that 25% of the offspring will be green, 50% will be yellow-green, and 25% will be albino. To test their hypothesis about the distribution of offspring, the biologists mate 84 randomly selected pairs of yellow-green parent plants. Of 84 offspring, 23 plants were green, 50 were yellow-green, and 11 were albino. Do the data provide convincing evidence at the $\alpha = 0.01$ level that the true distribution of offspring is different from what the biologists predict?

7. A study in Charlotte, NC, tested the effectiveness of three police responses to spouse abuse: (1) advise and possibly separate the couple, (2) issue a citation to the offender, and (3) arrest the offender. Police officers were trained to recognize eligible cases. When presented with an eligible case, a police officer called the dispatcher, who would randomly assign one of the three available treatments to be administered. There were a total of 650 cases in the study. Each case was classified according to whether the abuser was subsequently arrested within six months of the original incident.

Subsequent arrest?	Treatment		
	Advise & Separate	Citation	Arrest
Yes	187	181	175
No	25	43	39

- a. Explain the purpose of the random assignment in the design of this study.
- b. State an appropriate pair of hypotheses for performing a chi-square test in this setting.
- c. Assume that all of the conditions for performing the test are met. The test yields $\chi^2 = 5.063$ and a P-value of 0.0796. Interpret this P-value in context. What conclusion should we draw from the study?

8. In the United States, there is a strong relationship between education and smoking: well-educated people are less likely to smoke. Does a similar relationship hold in France? To find out, researchers recorded the level of education and smoking status of a random sample of 459 French men aged 20 to 60 years. The two-way table below displays the data.

	Education		
Smoking Status	Primary School	Secondary School	University
Nonsmoker	56	37	53
Former Smoker	54	43	28
Moderate Smoker	41	27	36
Heavy Smoker	36	32	16

Is there convincing evidence of an association between smoking status and educational level among French men aged 20 to 60 years?

9. The student in Mrs. De Marre's class measures the arm spans and heights (in inches) of a random sample of 18 students from their large high school. Some computer output from a least-squares regression analysis on these data is shown below. Construct and interpret a 90% confidence interval for the slope of the population regression line. Assume that the conditions for performing inference are met.

Predictor	Coef	Stdev	t-ratio	p
Constant	11.547	5.600	2.06	0.056
Armspan	0.84042	0.08091	10.39	0.000

S = 1.613

R-Sq = 87.1%

R-Sq(adj) = 86.3%