

NAME:

Statistics 111 Summer Session II

**Homework Seven**

You are allowed to discuss problems with other students, but the final answers must be your own work.

For all problems that require calculation, YOU MUST ATTACH SEPARATE PAGES, NEATLY WRITTEN, THAT SHOW YOUR WORK.

Please mark your answer in the space provided. As a general rule, each blank counts for one point unless otherwise specified. If necessary work is not shown, or if that work is substantially wrong, then you will not get credit even if the answer is correct. (The obvious purpose of this is to prevent students from mindlessly copying each other's answers.)

Report all numerical answers to at least two correct decimal places.

**DUE DATE: START of class on Friday, August 3, 2018.**

1. **(Difference of two proportions)** A 2010 survey asked 827 randomly sampled registered voters in California “Do you support? Or do you oppose? Drilling for oil and natural gas off the Coast of California? Or do you not know enough to say?” Below is the distribution of responses, separated based on whether or not the respondent graduated from college. <sup>1</sup>

	<i>College Grad</i>	
	Yes	No
Support	154	132
Oppose	180	126
Do not know	104	131
Total	438	389

- (a) What percent of college graduates and what percent of the non-college graduates in this sample do not know enough to have an opinion on drilling for oil and natural gas off the Coast of California?
- (b) Let  $p_{CG}$  represent the proportion of college graduates who responded “do not know”, and  $p_{NCG}$  represent the proportion of non-college graduate who responded “do not know”. What are the pair of hypotheses to determine if the data provide strong evidence that the proportion of college graduates who do not have an opinion on this issue is different than that of non-college graduates? Write the hypotheses in symbols.

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<sup>1</sup>Survey USA, Election Poll #16804, data collected July 8-11, 2010

(c) Check conditions. Are the "independence" and "Success-failure" conditions satisfied? Explain your reasoning.

(d) Calculating the test statistics and p-value

(e) What is the conclusion of the hypothesis test?

2. **(Testing for Independence in Two-way Tables)** Below is the same data set we first encountered in Problem 1 that examines the responses of a random sample of college graduates and non-graduates on the topic of oil drilling.

	<i>College Grad</i>	
	Yes	No
Support	154	132
Oppose	180	126
Do not know	104	131
Total	438	389

(a) Complete a chi-square test for these data to check whether there is a statistically significant difference in responses from college graduates and non-graduates. First, write the hypotheses in words.

(b) Check conditions, are the "independence" and "sample size" conditions satisfied? Explain your reasoning.

(c) Calculate the chi-square statistics and the degrees of freedom associated with it.

(d) Find the (range of) p-value

(e) What is the conclusion of this hypothesis test?

3. (**Testing for goodness of fit using chi-square**) A professor using an open source introductory statistics book predicts that 60% of the students will purchase a hard copy of the book, 25% will print it out from the web, and 15% will read it online. At the end of the semester he asks his students to complete a survey where they indicate what format of the book they used. Of the 126 students, 71 said they bought a hard copy of the book, 30 said they printed it out from the web, and 25 said they read it online.

(a) State the hypotheses for testing if the professor's predictions were inaccurate.

(b) How many students did the professor expect to buy the book, print the book, and read the book exclusively online?

(c) This is an appropriate setting for a chi-square test. List the conditions required for a test and verify they are satisfied.

(d) Calculate the chi-squared statistic, the degrees of freedom associated with it, and the (range of) p-value.

(e) Based on the p-value calculated in part (d), what is the conclusion of the hypothesis test? Interpret your conclusion in this context.

How hard was this homework for you and how many hours did it take you to finish it?

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