

Name: _____

MAT 222

Fall 2019

Homework 7

“Don’t do anything I would do, and definitely don’t do anything I wouldn’t do. There’s a little grey area there, and that’s where you operate.”

– Tony Stark, Spider-Man Homecoming

Problem 1: What are the conditions on the expected counts for a Chi-Squared test are required?

Problem 2: Suppose you are performing a Chi-squared analysis test between factors ‘hours studied’ and ‘exam grade’. If you reject the the null hypothesis, does mean that the data suggests that the amount of hours studied predicts your exam grade or influences your exam grade?

Problem 3: Benford's Law is an observation that the frequency distribution of leading digits in many 'real-life' datasets follows a certain distribution, given below:

Digit	1	2	3	4	5	6	7	8	9
Proportion	0.301	0.176	0.125	0.097	0.079	0.067	0.058	0.051	0.046

This is even used as a starting point for detecting fraud. Suppose you have a financial data set with leading digit counts given below:

Digit	1	2	3	4	5	6	7	8	9
Count	41	22	13	12	9	8	8	8	7

Use a chi-square analysis to determine if the given dataset is consistent with Benford's Law. Be sure to state your degrees of freedom, test statistic, p -value, and to interpret your conclusion.

Problem 4: A graduate program is trying to evaluate the quality of success of students accepted to their Masters program to make better future admissions decisions. To determine the quality of success of the students, they use whether students achieve a 'High Pass' or 'Low Pass' on their Master's Exams. The data is broken down by the type of undergraduate university the student attended.

	High Pass	Low Pass
Public	15	17
Private	19	14
International C	17	16

Use an appropriate test to determine if there is a relationship between the type of university a student attended and whether the achieved a 'High Pass' or 'Low Pass' on their Master's Exams. Be sure to state your null and alternative hypotheses in the context, give your degrees of freedom, test statistic, and p -value, and state your conclusion in the context of the problem.