STAT 110: Practice Problem 7
Fall 2017

In 2009, Mahmoud Ahmadinejad won Iran's presidential election in an unexpected landslide victory, and many were suspicious that the election results were fraudulent. To investigate this, we could focus on the last digit of the number of votes received by each candidate in different provinces. For example, if a candidate received 14,579 votes in a particular province, we would focus on the last digit of this number, which is 9. In a non-fraudulent election, each digit (0-9) should appear equally often as the last digit (i.e., 10% of the time). However, based on the observed counts shown below, this may not have been the case in the Iranian election. For example, out of 120 provincial vote totals, we observed the digit 7 as the last digit in 19 cases (i.e., 19/120 = 16% of the time).

Last Digit	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	
Observed Count	10	11	8	8	11	5	16	19	18	14	Total Number of Observations = 120

<u>Research Question</u>: Is there evidence that the digits 0-9 do not appear equally likely in the last position of the provincial vote totals (which may indicate election fraud)?

1. Write the null and alternative hypotheses for investigating this research question.

2. How many of the 120 provincial vote totals do we expect to end with the digit 7 if the election was non-fraudulent? Show your work to justify your answer.

3. Find the chi-square test statistic for investigating this research question by hand.

4. Analyze the data in JMP to find the p-value for investigating this research question.

5. Write a conclusion in the context of the research question.