This is the final part of the three-part class project. The grading for the course project will be 80% correctness, 20% clarity of presentation.

Problem 1. In 1960, a young statistician conducted a survey of his small hometown. He selected 20 households in his town at random and asked them how large their household was. The results of this survey are shown to the right.

(a) Using the appropriate technique from Chapter 4, determine the sample mean $\overline{x}$ and sample standard deviation s for this sample.

(b) Determine a 95% confidence interval for μ, the average number of persons per household in the town. Express your answer to two decimal places.

1960 Town Survey Results	
Size of household	Frequency
1	3
2	7
3	5
4	2
5	2
6	0
7	0
8	1

Problem 2. Inspired by these preliminary results, the young statistician commissioned a larger survey to determine the average size of an *American* household. The results of the simple random sample of 1,164 households yielded the results shown to the right.

(a) Determine the sample mean $\overline{x}$ and sample standard deviation s for this sample.

(b) Determine a 95% confidence interval for μ, the average number of persons in a 1960 American household. Express your answer to two decimal places.

1960 U.S. Survey Results	
Size of household	Frequency
1	160
2	312
3	225
4	199
5	142
6	71
7	35
8	18
9	2

Problem 3. According to the 1960 Census, the average size of an American family was $\mu = 3.35$ persons and a standard deviation of $\sigma = 1.82$ persons. However, as the years have passed, the (now older) statistican believes that the average size of an American household has decreased since 1960. The statistician believes that, in the intervening 37 years, people are getting married later, divorce rates are higher, and the birth rate is lower. Accordingly, he commissions another survey in 1997; this new survey used a simple random sample of 636 American households. The results are shown to the right.

1997 U.S. Survey Results	
Size of household	Frequency
1	158
2	203
3	117
4	96
5	40
6	15
7	4
8	2
9	1

In this problem, we will consider the demographic changes in American households since 1960.

(a) Determine the sample mean $\overline{x}$ for this sample.

(b) Formulate the null hypothesis H_0 and the alternate hypothesis H_1.

(c) Should a one-tailed or two-tailed test be employed? What is the critical value that corresponds to a level of significance of $\alpha = 0.01$?

(d) What is the $z-$value that corresponds to the above value of $\overline{x}$?

(e) Should the null hypothesis be accepted or rejected? In one sentence, state your conclusion in words.

Note: While the above story is ficticious, the data sets in Problems 2 and 3 *are* representative of the sizes of American households in 1960 and 1997. For more information, see the U.S. Census Bureau's Web page at `http://www.census.gov`