Stat 446 Homework #4 Due: Monday, September 21, 2015.

The answer to any exercise with ‡ must be written in sentence form to receive full credit. Please limit your answers to at most two (and if you deem it absolutely necessary, to three) coherent sentences for any part of an exercise. Your answers must be legible or they will be returned ungraded.

1. ‡ (.5pt) Exercise 7 (b) page 63. For part (a) the confidence interval is (.1514,.1986).

2. A company with 5107 employees conducted a survey to study the impact of sickness on the amount of time an employee misses work. A SRS of 640 employees yielded the following information about the number of workdays missed due to illness during the past 12 months:

Days missed	0	1	2	3	4	5	6	≥ 7
Frequency	176	134	102	70	53	49	33	23

   (a) (.5pt) Based on this sample, estimate the population proportion p of employees that have not missed any workdays during the past 12 months.

   (b) (1.5pt) Generate a 95% confidence interval for p.

   (c) ‡ (1pt) Let L and U be the lower and upper confidence interval limits you just calculated. The company CEO uses this information and states that he is 95% confident that the proportion of fulltime employees who worked for the past 12 months that did not miss any workdays due to illness is between L and U. You were chosen to tell her why this is a misinterpretation of the confidence interval.

   (d) ‡ (1pt) State why there is a coverage error with respect to the population inferred in the CEO's statement, and indicate if it is overcoverage or undercoverage.

   (e) ‡ (1pt) Give an example of a potential observational error may arise in this survey.

3. (2pt) Exercise 11(c) only, pages 63-64.

4. To estimate the proportion of voters who support a controversial proposition to be voted on in an upcoming election, a preliminary survey based on a SRS of 1600 eligible voters was taken. The 1600 sampling units were contacted and questioned. Of these, 948 reported that they were against the proposition.

   (a) (1.5pt) Using the results from this preliminary survey, what sample size would be required so that the sample proportion would be within .04 of the true proportion p of eligible voters who are against the proposition with 95% confidence? Assume the population size of eligible voters is 500,000.

   (b) (1.5pt) Suppose that a week later a SRS of eligible voters of the size you determined was collected. After the election, the sample proportion was compared to the election result proportion. The sample proportion was .07 less than the proportion from the actual vote. Provide three reasons how the sample proportion could be off by .07 when it was planned to be off by at most .04? (You can assume that the SRS was actually collected among eligible voters.)

5. (1pt) Exercise 9, page 63.

6. (.5pt) In Exercise 9, page 63, why is there the caveat that $n_o/N \leq 1$?

7. (2pt) **For Stat grad students only**: Exercise 24, page 67.