Introduction to Statistics
Activity 8.3b **NAME:**

Percent of Folks w/Cellphones

a) Suppose a market research firm is hired to estimate the percentage of adults living in a large city who have cell phones. Five hundred adult residents are chosen in a simple random sample from the city and are surveyed to determine whether they have cell phones. Of the 500 people sampled, 421 responded yes - they own cell phones, the rest say they don't. Using a 95% confidence level, compute a confidence interval for the true proportion of adult residents of this city who have cell phones.

1. What are the sample size and sample proportion?
   Use the correct notation.

Confidence Level	z^*-value
80%	1.28
90%	1.645 (by convention)
95%	1.96
98%	2.33
99%	2.58

2. What's the estimated standard error of the sample proportion?

3. What is the critical value (z^*)?
4. What is the margin of error?

$$\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

5. What is the confidence interval?

6. Describe this CI **in-context** (provide a sentence, it should mention cell phones!).

7. What do we mean by 95% confident?

b) Another 500 people are sampled. This time, 460 of the respondents said that they owned a cell phone.
   1. What is the sample proportion?

2. Was this result likely to happen according to our previous result?

3. What do you think about your confidence interval?

c) The organizers want to settle this once and for all. They want a survey done that will have only 1% margin of error with a 99% confidence level! Below, you'll calculate the necessary sample size.
   1. Calculate the average of the two sample proportions. Use this as your new sample proportion.

   2. Write down some potentially useful math expressions related to this question's introduction.

   3. From these, fill in constants you know, and attempt to solve for the unknown sample size n.

   4. Report your result in context.

   5. The city's population is 450,000. Can we meet the technical requirements for CLT?