Confidence level and interval length NAME:

Here, we will investigate several poll results and the corresponding confidence intervals. We will see what effect the confidence level (99%, 95%, 90%, etc.) has on the length of the interval.

We will use the following poll results from Gallup. The poll, which was conducted on March 26-28, 2004, asked American adults the following questions. The sample proportions are provided.

Question	Sample proportion
Is the cost of gasoline a crisis for the US?	13% YES
Is the cost of gasoline a major problem for the US?	56% YES
Do the recent price increases reflect a more permanent change in the cost of gasoline?	55% YES

(source: www.gallup.com)

1. First, it is important to remember what exactly we are saying with a confidence interval. The above poll was asked of 1,001 American adults. Form a 95% confidence statement for the third result in the table. Round your margin of error to three decimal places before converting to percent form.

2. When we make this confidence statement, we are saying we are fairly certain (95% certain) that the true proportion of all Americans who feel this way is somewhere between 51.9% and 58.1%. Make sure this jives with your own understanding. Now, if I wanted to be more certain that the true proportion was in the interval I gave, should I make the interval shorter or longer?

Remember the formula for confidence intervals depends on the sample proportion, $\hat{p}$, the sample size, *n*, and the confidence level. The formula is $\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$ where z^* corresponds to the confidence level and is found in the table below.

Confidence level	70%	80%	90%	95%	99%
z^*	1.04	1.28	1.64	1.96	2.58

3. Let's see if you were right on question 2. Form a confidence interval for each of the confidence levels below. Use the sample question from before. Round your margins of error to three decimal places before converting to percent form. (Statements are not necessary.)

a.) Form a 90% confidence interval.

b.) Form a 99% confidence interval.

c.) Form an 80% confidence interval.

4. Which intervals are shorter than the 95% one? Which are longer? Do their respective lengths make sense? Explain why the intervals' lengths shorten as the confidence level decreases.