Hershey's Kisses and Confidence Intervals

Or, A Post-Valentine's Day (and Post-Midterm) Party

Use this space to record the names
of the other students in your group:

" I got the instructions from my Statistics Professor. He was 80% confident that the true location of the restaurant was in this neighborhood."

In this activity, we will estimate a confidence interval for how often a Hershey's kiss lands on its base as opposed to its side. To do this, we will drop Hershey's kisses, count how many land on their base, and calculate the confidence interval.

What is the population? ____

What is the sample? ____

To take your sample, gather ten Hershey's kisses in your hands, shake them up, and drop them from about six inches above your desk. Count the number that land on their base. Repeat five times to get a sample of size 50. Compare with the others in your group. Did you all get the same answer?

Your result: $\hat{p} =$ ______

The results of the others in your group:

______ ______ ______ ______ ______

Follow these steps to make a 95% confidence interval based on your result.

- Calculate the sample standard deviation of your sample proportion:

  sd $= \sqrt{\hat{p}(1-\hat{p})/n} =$ ______

- Look up the Z-score in your text that corresponds to 95% confidence:

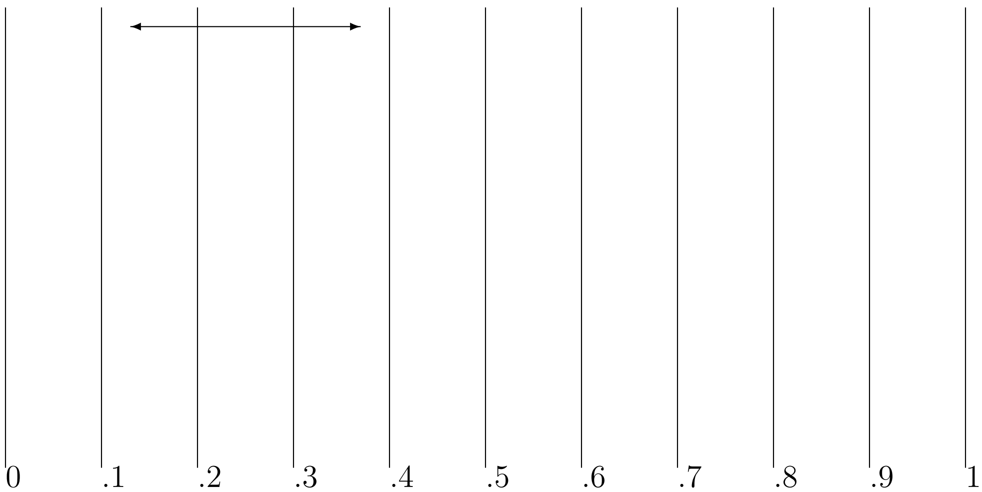
  $\Pr(-z_{0.95} < Z < z_{0.95}) = 0.95$; $z_{0.95} =$ ______

- The confidence interval is $\hat{p} \pm z_{0.95} \times \text{sd}$:

  your lower bound = __________

  your upper bound = __________

Use the lines below to roughly draw the confidence intervals of each person in your group. (An example of a CI from 0.13 to 0.37 is given.)



Interpret the 95% confidence interval on your own. Write your interpretation below.

Compare your interpretation with your group members' interpretations and come to an agreement on an appropriate interpretation. Write it below.

Now merge your individual samples into one big sample, and make a new confidence interval. Remember that n is changing!

Group confidence interval:____________________

Draw this confidence interval on the above lines.

Compare this confidence interval with the confidence intervals from your individual samples.

- Are the means different? If so, how?
- Are the standard deviations different? If so, how?
- Are the widths of the confidence intervals different? If so, how?

How did increasing the sample size affect the width of the confidence interval?

What statistical concept or principle does this remind you of?

When you're done, draw your group's confidence interval on the board.

If you're done before other groups, eat a Hershey's kiss and try to decide what your group thinks about these questions. (Remember that a confidence interval is a frequentist method.)

Which of the following is true?

A. There is a 95% probability that the true mean will fall in our interval.

B. There is a 95% probability that our interval will include the true mean.

Which of the following is true?

A. BEFORE we take the sample, there is a 95% probability that the confidence interval we will create WILL include the true mean.

B. AFTER we take the sample, there is a 95% probability that the confidence interval we created DOES include the true mean.