AP Stats Ch 18 - Required Practice Name: ____________________________ Per: ____

SAMPLING APPLET ACTIVITY – DAY 1

At least one person in your group use your phone's web browser to display: www.mrfelling.com/sa1

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(the full activity is detailed in the filled-in notes if you were absent and need to refer to it)

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Press the 'sample' button a few more times to see what happens as you continue to take samples of size n=9. ………

Compare the mean and standard deviation of the Sampling Distribution of Sample Means to the mean and standard deviation of the population. Notice that the means are about the same, but the standard deviation of the Sampling Distribution of Sample Means is much smaller than the population. Write a sentence or two explaining why you believe this is true:

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Let's investigate……

Try this for yourself, and fill in the standard deviations for the population and for the Sampling Distribution for each experiment (remember to press the 'Sample400x' button before recording the standard deviations.)

	Population	Sampling Distribution
Experiment 1 (n=1):	$\sigma =$ _______,	$\sigma_{\overline{X}} =$ ________
Experiment 2 (n=4):	$\sigma =$ _______,	$\sigma_{\overline{X}} =$ ________
Experiment 3 (n=9):	$\sigma =$ _______,	$\sigma_{\overline{X}} =$ ________
Experiment 4 (n=16):	$\sigma =$ _______,	$\sigma_{\overline{X}} =$ ________

Can you find any (approximate) relationship between the population and sampling distribution standard deviations? Write down what you think is occurring:

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Try this with the other shapes as well. How large does the sample size need to be before we can say the sampling distribution is approximately normal?

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SAMPLING APPLET ACTIVITY – DAY 2

Yesterday, we investigated the Sampling Distribution of Sample Means – which would apply whenever we have a numerical variable for which we could compute a mean. But what if we have categorical data, for example, a 'yes'/'no' situation for which we can only compute the percentage, or, *proportion,* of 'yes' in a population or sample?

At least one person in your group use your phone's web browser to display: www.mrfelling.com/sa2

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(the full activity is detailed in the filled-in notes if you were absent and need to refer to it)

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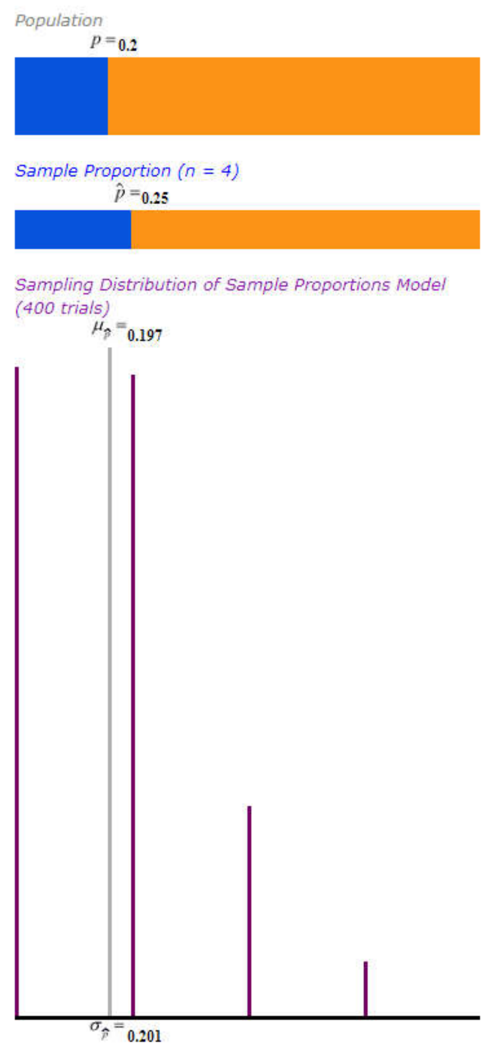
$$\boxed{\mu_{\hat{p}} = p \qquad \sigma_{\hat{p}} = \sqrt{\frac{p(1-p)}{n}}}$$

Do these formulas correctly predict the mean and standard deviation for our sampling distribution of sample proportions in our phone applet?

Is the shape of the sampling distribution of sampling proportions always Nearly Normal?

Let's investigate...if we 'reset' and select p=0.2 and n=4, then run many trials, we'll get something like this:



Not Nearly Normal.

Reset, and try the following settings:

p = 0.2, n = 8

p = 0.2, n = 16

p = 0.2, n = 25

p = 0.2, n = 50

p = 0.2, n = 6

p = 0.3, n = 6

p = 0.5, n = 6

Write a few sentences describing the trends that you see:

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Practice Problems…

#1. Suppose that the mean adult weight is 175 pounds with a standard deviation of 25 pounds. An elevator in a building has a weight limit of 10 persons or 2000 pounds. What's the probability that the 10 people who get on the elevator will overload its weight limit?

#2. Suppose that about 13% of the population is left-handed. A 200-seat school auditorium has been built with 15 "lefty seats", seats that have the built-in desk on the left rather than the right arm of the chair. In a class of 90 students, what's the probability that there will not be enough seats for the left-handed students?

1. Coin tosses. In a large class of introductory Statistics students, the professor has each person toss a coin 16 times and calculate the proportion of his or her tosses that were heads. The students then report their results, and the professor plots a histogram of these several proportions.

a) What shape would you expect this histogram to be? Why?

b) Where do you expect the histogram to be centered?

c) How much variability would you expect among these proportions?

d) Explain why a Normal model should not be used here.

5. Just (un)lucky? One of the students in the introductory Statistics class in Exercise 1 claims to have tossed her coin 200 times and found only 42% heads. What do you think of this claim? Explain.

16. Seeds. Information on a packet of seeds claims that the germination rate is 92%. What's the probability that more than 95% of the 160 seeds in the packet will germinate? Be sure to discuss your assumptions and check the conditions that support your model.

17. Apples. When a truckload of apples arrives at a packing plant, a random sample of 150 is selected and examined for bruises, discoloration, and other defects. The whole truckload will be rejected if more than 5% of the sample is unsatisfactory. Suppose that in fact 8% of the apples on the truck do not meet the desired standard. What's the probability that the shipment will be accepted anyway?

Chapter 18 Practice Quiz

AP Statistics Quiz B – Chapter 18 ***Name***_______________________

1. It is generally believed that electrical problems affect about 14% of new cars. An automobile mechanic conducts diagnostic tests on 128 new cars on the lot.
   a. Describe the sampling distribution for the sample proportion by naming the model and telling its mean and standard deviation. Justify your answer.

   b. Sketch and clearly label the model.

   c. What is the probability that in this group over 18% of the new cars will be found to have electrical problems?

2. Herpetologists (snake specialist) found that a certain species of reticulated python have an average length of 20.5 feet with a standard deviation of 2.3 feet. The scientists collect a random sample of 30 adult pythons and measure their lengths. In their sample the mean length was 19.5 feet long. One of the herpetologists fears that pollution might be affecting the natural growth of the pythons. Do you think this sample result is unusually small? Explain.