Sampling Variability Questions
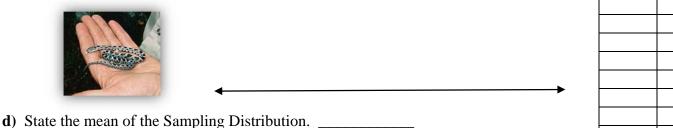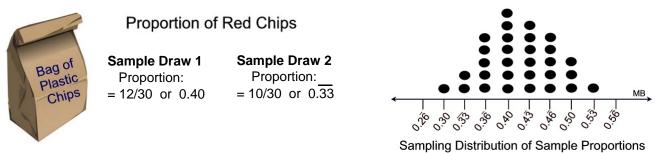
Name_____

Directions: Read carefully. Find answers to the *nearest hundredths* unless told otherwise.

1. A snake lays 4 eggs which hatch into one male and three females: Martin, Alisa, Tabitha and Heather. Two of the baby snakes are selected at random with replacement.

a) In the chart, identify the 16 possible samples. (Martin, Alisa) and (Alisa, Martin) are different.

b) In the chart, find the proportion, *p,* of females in each of the samples.

c) Create a dot plot to model the Sampling Distribution of Sample Proportions.

Sample	*p*

d) State the mean of the Sampling Distribution. _____

e) What is the population proportion of females? _____

f) Is the mean of the Sampling Distribution equal to the population proportion of females? _____

g) In this specific situation, it can be said (without any calculations) that the mean of the Sampling Distribution will be EQUAL to the population proportion. How do we know that it is "EQUAL to" and not just an "approximation of" the population proportion?

2. In a class of 30 students, each student pulls a random sample of 30 chips, with replacement, from a brown paper bag containing red chips and white chips. The number of red chips is counted.

Bag of Plastic Chips

Proportion of Red Chips

Sample Draw 1
Proportion:
= 12/30 or 0.40

Sample Draw 2
Proportion: __
= 10/30 or 0.33

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Sampling Distribution of Sample Proportions

A dot plot of the 30 sample proportions of red chips reported by each student is shown above.
Using a calculator (round to *nearest thousandths*),

a) find the mean of the Sampling Distribution. _____

b) find the standard deviation of the Sampling Distribution. _____

c) Based upon your findings, what is the population proportion? _____

d) If the bag contains 100 chips, of which 40 are red, what is the actual population proportion? _____

e) Why, in this problem, is the actual population proportion different from the mean of the sampling distribution of the sample proportions?

Sample	$\bar{x}$

3. The heights, in inches, of the five star basketball players of the Smithtown High School team are 70", 72", 71", 73" and 69". Two of the players are selected at random with replacement.

a) In the chart, identify the 25 possible samples. (70", 71") and (71", 70") are different.

b) In the chart, find the mean, $\bar{x}$, of the heights in each of the samples.

c) Create a dot plot to model the Sampling Distribution of Sample Means.

d) What do you notice about the shape of the dot plot?

Grab your calculator:

e) State the mean of the Sampling Distribution. _____

f) Is the mean of the Sampling Distribution equal to the population mean of the heights? _____ Explain.

g) What is the standard deviation of the Sampling Distribution? _____

4. A survey asked 60 students in each of 50 different high schools to estimate how many times they sent a text message during a school day. The sampling distribution of the sample means (rounded to the nearest integer) are shown at the right.

Sampling Distribution of Sample Means

Using your calculator,

a) find the mean of the Sampling Distribution. _____

b) find the standard deviation of the Sampling Distribution. _____

c) Based upon your findings, what can you say about the population mean?