

LESSON #7: USING SAMPLE DATA TO ESTIMATE A POPULATION CHARACTERISTIC

Recall:

- A population is the entire set of subjects in which there is an interest.
- A sample is a part of the population from which information (data) is gathered, often for the purpose of generalizing from the sample to the population.
- A random sample is one that gives every different possible sample an equal chance to be chosen.

Populations and samples are not always composed of people; it could be plants, insects, mice, TV's etc. In the following, identify whether the subjects being measured are the **sample** or the **population**. Explain each answer.

Subjects	What Is Being Measured	Sample or Population? Explain
AA batteries of a certain brand	Lifetime	sample. if you use <u>all</u> batteries there would be none left.
Students in your school	Number absent or present today	population. All students are being accounted for
Words in the Constitution of the U.S.	Whether a noun or not	population. All words are being considered
Americans of voting age	Opinion on an issue	sample. unrealistic to think <u>all</u> americans can be asked their opinion

COIN TOSS!

Directions: Flip your coin 25 times. Record whether you get heads or tails on each flip.

1. Make sure you record all 25 trials! Write **H** for Heads and **T** for Tails

H	H	T	H	T
T	T	H	H	H
T	H	T	H	T
T	T	T	H	T
T	H	T	T	H

of Heads = 11 # of Tails = 14

2. Calculate the ratio of HEADS $\frac{\text{\# of Heads}}{25} = \left(\frac{11}{25}\right)$

6. Based on the simulation your teacher does on the smartboard, answer the following questions:

When tossing a coin, what was the mean, standard deviation, lowest and highest proportion of the sampling distribution when the number of tosses was:

a) 25

Mean = .485

S.D. = .114

Lowest = .32

Highest = .75

b) 100

Mean = .487

S.D. = .098

Lowest = .30

Highest = .75

c) 500

Mean = .499

S.D. = .099

Lowest = .24

Highest = .75

- d) What happened to the **mean** as the sample size got larger?

it got closer to the $P(\text{heads}) = .5$

- e) What happened to the **standard deviation** as the sample size got larger?

it got smaller!

- f) What happened to the **variability** of the sample proportion?

There was less variability as the # of tosses ↑
#s are closer together. ~~the~~ DISTRIBUTION = Normal.

CONCLUSION(S):

- The mean of the sampling distribution of the sample proportions will be approximately equal to the value of the population proportion.
- As the sample size increases, the variability and the standard deviation in the sample proportion decreases. less variability!

PRACTICE:

1. Below are three dot plots of the proportion of tails in 20, 60, or 120 simulated flips of a coin. The mean and standard deviation of the sample proportions are also shown for each of the three dot plots. Match each dot plot with the appropriate number of flips. Clearly explain how you matched the plots with the number of simulated flips.

<p>Dot Plot 1 Mean: 0.502 Standard deviation: 0.046 Sample Size: <u>120</u> Explain:</p>	<p><i>→ smallest SD</i></p> <p>0.30 0.35 0.40 0.45 0.50 0.55 0.60 0.65 0.70 0.75 Sample Proportion</p>
<p>Dot Plot 2 Mean: 0.518 Standard deviation: 0.064 Sample Size: <u>60</u> Explain:</p>	<p><i>Next largest SD</i></p> <p>0.30 0.35 0.40 0.45 0.50 0.55 0.60 0.65 0.70 0.75 Sample Proportion</p>
<p>Dot Plot 3 Mean: 0.498 Standard deviation: 0.110 Sample Size: <u>20</u> Explain:</p>	<p><i>biggest SD lowest sample size</i></p> <p>0.30 0.35 0.40 0.45 0.50 0.55 0.60 0.65 0.70 0.75 Sample Proportion</p>

2. An orange-juicing plant receives a truckload of oranges. The quality control team randomly chooses three pails of oranges, each containing 50 oranges, from the truckload.

- a. Identify the sample and the population in the given scenario.

sample - 3 pails of oranges

population - truckload of oranges

- b. State one conclusion that the quality control team could make about the population if 5% of the sample was found to be unsatisfactory.

It is likely that 5% of the population of oranges are unsatisfactory

Name: Key
CC ALGEBRA 2

Date: 5/21/18
TROICI

LESSON #7: EXIT TICKET

1. For each of the following, does the group described constitute a population or a sample?

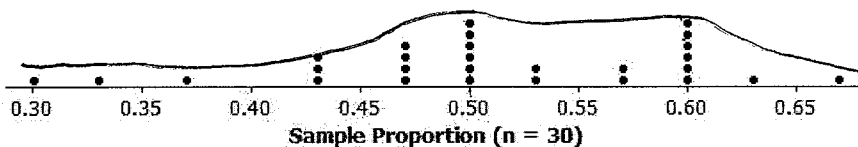
• The animals that live in Yellowstone National Park
population

• Every tenth person is asked how they voted in an exit poll
sample

• Some cars on the lot of the local car dealer
sample

• The words of the Gettysburg Address
population

2. A group of eleventh graders wanted to estimate the population proportion of students in their high school who drink at least one soda per day. Each student selected a different random sample of 30 students and calculated the proportion of drinks the students drink at least one soda per day. The dot plot below shows the sampling distribution.



a) Describe the shape of the distribution.

approximately normal, slightly skewed left

if there are 680 students in the school

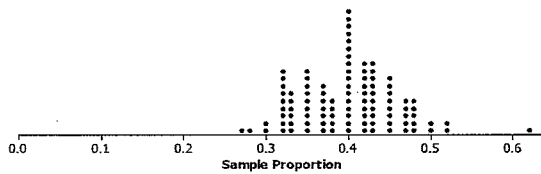
b) What is your estimate for the proportion of *all* students who would report that they drink at least one soda per day?

approximately .50 of all students drink one soda/day.

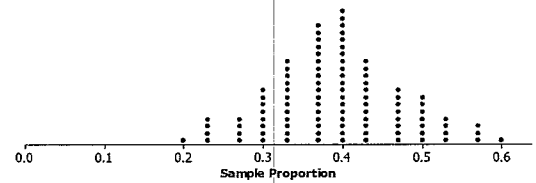
$$\underline{680(.5) = 340 \text{ students}}$$

3. Below are two simulated sampling distributions for the sample proportion of female students in random samples from all the students at Union High School.

Simulated Sampling Distribution 1



Simulated Sampling Distribution 2



- a. Based on the two sampling distributions above, what do you think is the population proportion of female students?

population proportion = .40 b/c that is the sample proportion for both

- b. One of the sampling distributions above is based on random samples of size 30, and the other is based on random samples of size 60. Which sampling distribution corresponds to the sample size of 30? Explain your choice.

sampling distribution #1 b/c there is more variability.