7.1 Sampling Distributions

Learning Objectives:
1. Distinguish between a parameter and a statistic.
2. Use the sampling distribution of a statistic to evaluate a claim about a parameter.
3. Distinguish among the distribution of a population, the distribution of a sample, and the sampling distribution of a statistic.
4. Determine whether or not a statistic is an unbiased estimator of a population parameter.
5. Describe the relationship between sample size and the variability of a statistic.

Vocabulary: parameter, statistic, sampling distribution, population distribution, distribution of a sample data, unbiased estimator, biased estimator, variability of a statistic

Read 424–425
What is a parameter? What is a statistic? How is one related to the other?

Alternate Example: Identify the population, the parameter, the sample, and the statistic:
(a) A pediatrician wants to know the 75th percentile for the distribution of heights of 10-year-old boys, so she takes a sample of 50 patients and calculates $Q_3 = 56$ inches.

population: **parameter:**

sample: **statistic:**

(b) A Pew Research Center Poll asked 1102 12- to 17-year-olds in the United States if they have a cell phone. Of the respondents, 71% said "Yes."

population: **parameter:**

sample: **statistic:**

| ACTIVITY: Reece's Pieces |
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Read 425–428
What is sampling variability? Why do we care?

What is a sampling distribution? Why do we care?

A father has four sons with heights of 68, 71, 72, and 75 inches. Determine the sampling distribution of the sample mean height $\bar{x}$ for samples of size $n = 2$

What is the difference between the **distribution of the population**, the **distribution of the sample**, and the **sampling distribution** of a sample statistic?

> **Page 428 Poker Chip Example**: Bag with 200 poker chips (100 red & 100 blue), each student takes a SRS of 20 chips and records the proportion of RED chips.
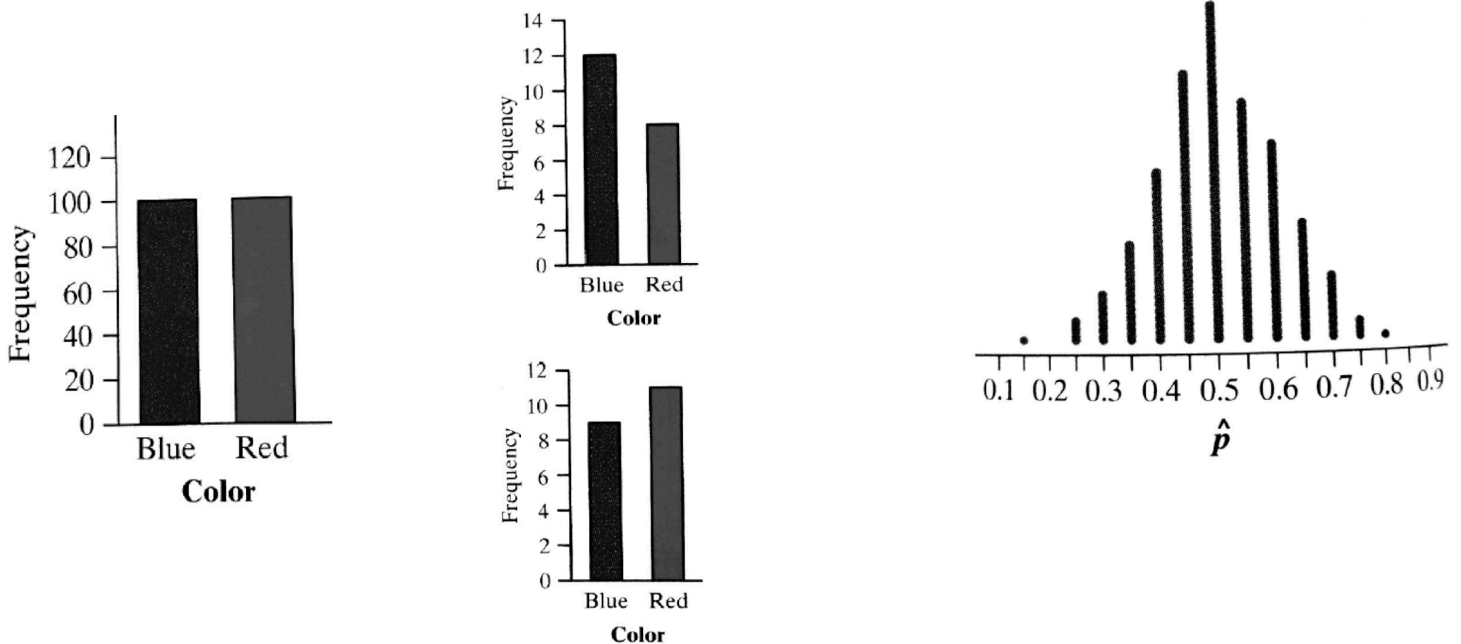
Read 429–435

A statistic used to estimate a population parameter is an _____, but only if the mean of its sampling distribution is equal to the value of the parameter being estimated.

A statistic that is consistently higher or lower than the population parameter is a _____

_____.

| ACTIVITY | Population is a bag of 50 different numbers, each student should take at least 25 SRS of size 4. |

1. Find the average and range, and record the statistics.

Sample #	$\bar{x}$	range
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

Sample #	$\bar{x}$	range
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

2. Create a dotplot of the sample means.

3. Create a dotpolot of the sample ranges.

4. Use 1-VarStat to find the average sample mean and the average sample range.

5. Teacher will disclose: Population mean_____ & population range_____

6. Based on your approximate sampling distribution of $\bar{x}$ and the sample range, which statistic appears to be an unbiased estimator? Which appears to be a biased estimator?

How can you reduce the variability of a statistic?

What effect does the size of the population have on the variability of a statistic?

What is the difference between accuracy and precision? How does this relate to bias and variability?

HW page 436 #1, 3, 5, 7, 8, 9, 11, 13, 15, 19