

7.1 - What Is a Sampling Distribution?

Notes provided by **E. Kelly Pendleton** from **Ardrey Kell High School**, including:

- parameters & statistics
- sampling variability
- describing sampling distributions

adjust as you wish

email elizabethk.pendleton@cms.k12.nc.us if you need the flipchart version

Scores on the Math portion of the Standard Achievement Test (SAT) are normally distributed with mean of 529 and variance of 5732. Scores on the Verbal portion of the SAT are normally distributed with mean of 474 and variance of 6368. Select two students at random. Let M denote the first student's Math score, and let V denote the second student's Verbal score. What is $P(M > V)$?

7.1

Sampling Distributions

Parameter

- a number that describes the **population**
- a **fixed** number, but usually **unknown**

Statistic

- a number that describes a **sample**
- **varies** from sample to sample
- use to **estimate** an unknown parameter

Notation:

	Statistic	Parameter
Mean		
Standard Deviation		
Proportion		

Homework

Go over pg. 428 #1-8

Women's heights are Normally distributed with mean 64.5 inches and standard deviation 2.5 inches. Generate 4 random samples of size 100 with your L1 & record the mean and standard deviation of each sample on the sticky note.

*L1=randNorm(mean, st.dev, n)

sampling variability

the value of the statistic varies in repeated sampling

sampling distribution of a statistic

the distribution of values taken by the statistic in all possible samples of the same size from the same population

Bias

A statistic used to estimate a parameter is **unbiased** if the mean of its sampling distribution is equal to true value of the parameter being estimated.

Variability

-The **spread** of its sampling distribution

-determined by the sampling **design** and the **size of the sample**.

-**Larger samples give smaller spread.**

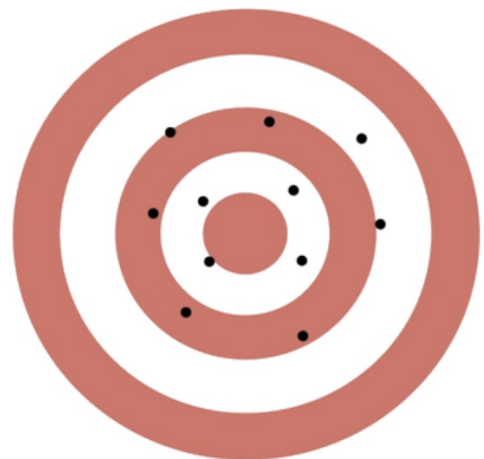
-If the population is at least 10 times as large as the sample, then the spread of the sampling distribution is approximately the same for any population size.

Goal: **LOW bias** & **LOW variability**



High bias, low variability

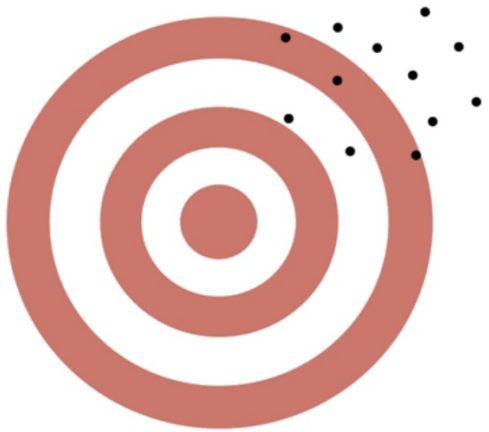
(a)



Low bias, high variability

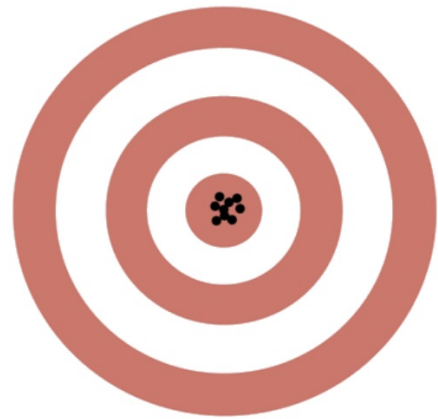
(b)

FIGURE 7.8
(p. 426)



High bias, high variability

(c)

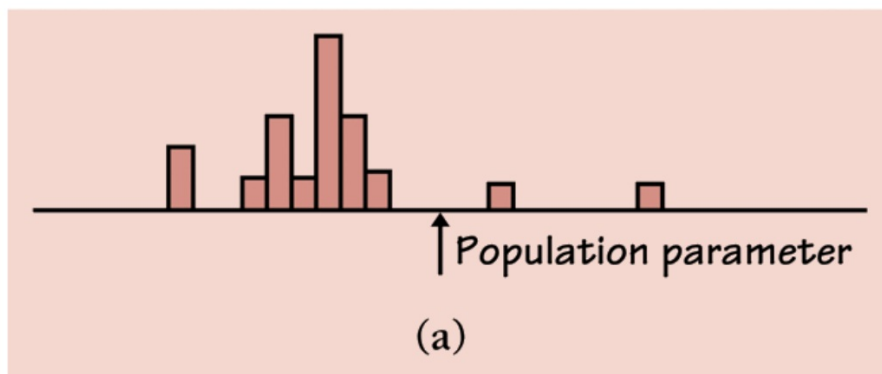


The ideal: low bias, low variability

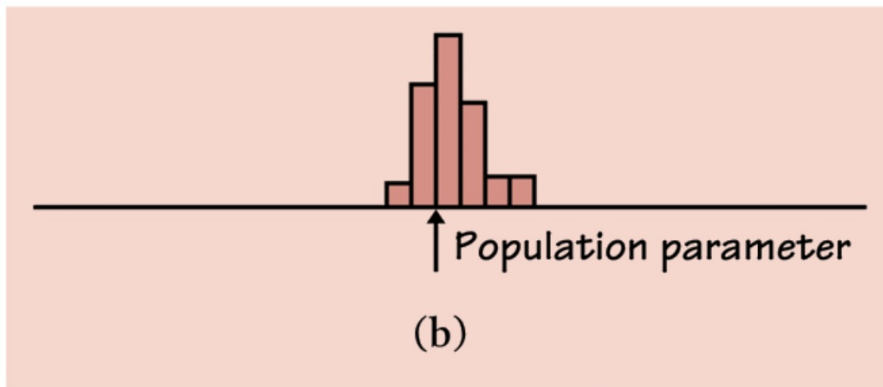
(d)

Example: EXERCISE 7.19 (p. 430)

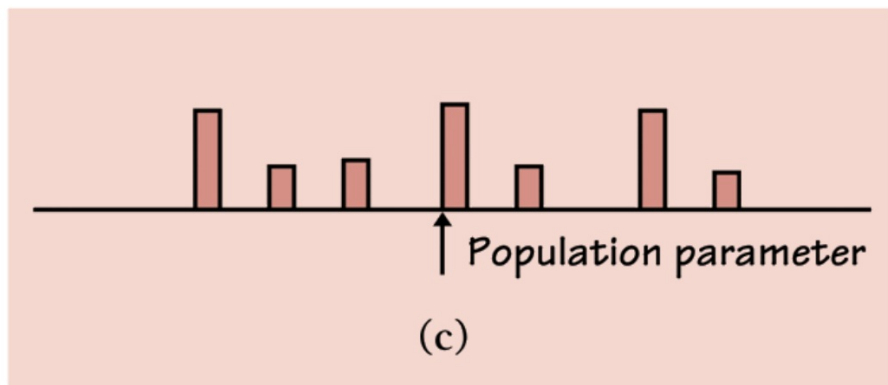
Label each distribution as having large or small bias and as having large or small variability.



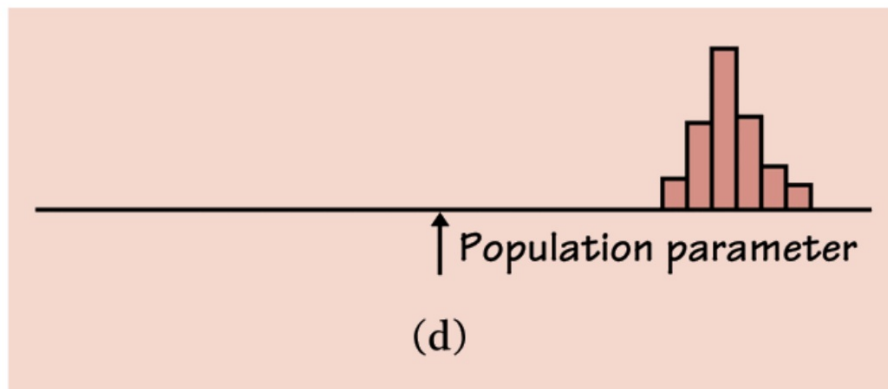
large bias, large variability



small bias, small variability



small bias, large variability



small variability, large bias

- Get a **chromebook** and go to akstats.weebly.com
- Click on Unit 4 - Sampling Distributions, and then download the PDF titled "7.1 worksheet" from today's date in the schedule. **[supplemental materials provided by textbook resources]**
- In your notes, complete the worksheet. I will check periodically that you're doing the problems and getting the answers correct.