



Today

A new method of
Sampling data

[in a good way :)]

4.1 Day 2B

A second look at How Much Do Fans Love Justin Timberlake?

In the next city, Justin Timberlake's concert promoter again wants to find out how much fans enjoy his concerts. He will ask fans, "From 1 to 100, where 100 is the most, how much did you enjoy the concert?"

Again, he wants to take a sample of 10 fans. *He also would like to try out a couple of new methods for sampling.*

1. Method #1:

Take a simple random sample (SRS) of 10 fans.



You don't need
to describe.

Just take a new
sample.

2. Method #2:

Yesterday we decided the row would have a big impact their enjoyment. The promoter decides to sample **entire columns** (sample every fan in the selected columns).



- Why would sampling all the fans in a column give a good estimate?
- How many columns will the promoter need to select to get a sample of 10 fans? Randomly choose the columns and mark the fans that will be sampled.

3. Method #3:

Justin's manager thinks it is important to sample fans that have different views of the stage. He wants to sample every 7th fan.



- a. First, we need to figure out the starting fan. Randomly select a fan and mark with an X.

- b. Begin marking every 7th seat until you get a sample of 10 seats (start back at the beginning if you need to).

4. Which method do you think is best? Why?

5. Now, it's time for the actual data. For each of your samples on the previous page, calculate the average enjoyment. Add your average to the dotplots on the board.

Sample #1: $\bar{x} =$

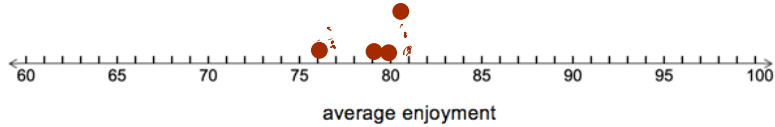


Sample #2: $\bar{x} =$

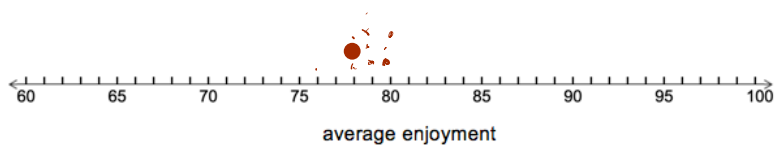
Sample #3: $\bar{x} =$

92	89	90	88	95	100	98	93	95	84
82	86	90	88	86	91	90	89	85	83
80	74	80	67	81	82	76	77	74	65
72	68	74	73	70	69	72	70	68	67
69	67	68	68	64	66	63	63	70	68

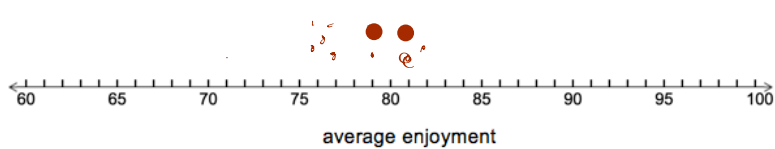
Method #1: SRS



Method #2: Cluster Sample



Method #3: Systematic Random Sample



More Random Sampling Methods – Day 2B

Important Ideas:

Cluster Sample

Systematic
Random Sample

Benefits of each type

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Cluster Sample

split popul. into groups
based on location.

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Important Ideas:

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- split popul. into groups based on location.
- Use an SRS to choose clusters.

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More Random Sampling Methods — Day 2B

Important Ideas:

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- split popul. into groups based on location.
- Use an SRS to choose clusters.
- sample all individuals in clusters.

Systematic
Random Sample

Benefits of each type

More Random Sampling Methods — Day 28

Important Ideas:

Cluster Sample

- split popul. into groups based on location.
- Use an SRS to choose clusters.
- sample all individuals in clusters.
- cluster - heterogeneous
- strata - homogeneous

Systematic Random Sample

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More Random Sampling Methods — Day 28

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Systematic Random Sample

- Randomly choose a starting position
- then sample with an equal interval between individuals

Benefits of each type

↑
NOT SRS

More Random Sampling Methods — Day 28

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Benefits of each type

SRS - unbiased

More Random Sampling Methods — Day 28

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Benefits of each type

SRS - unbiased

Stratified - unbiased & low variability

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- SRS - unbiased
- Stratified - unbiased & low variability
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More Random Sampling Methods — Day 28

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Benefits of each type

- SRS - unbiased
- Stratified - unbiased & low variability
- cluster - Easy to sample
- Systematic - don't need to label everyone.

The Hospital

Each group will display
one answer a little later.

The Hospital: A large hospital would like to survey their patients on their level of satisfaction with their hospital room. The hospital has 10 floors, each with 15 rooms (total of 150 rooms). The hospital staff would like to take a sample of 30 rooms.

1. Describe how to select a **stratified random sample** of 30 rooms.

2. Describe how to select a **cluster sample** of 30 rooms.

3. Describe how to select a **systematic random sample** of 30 rooms.
4. Explain a benefit of using each of the three types of sampling methods in this context.

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1. Describe how to select a **stratified random sample** of 30 rooms.
 - Label rooms 1-15 on each floor. start on 1st floor.
 - Take SRS using $RNG(1, 10)$ for 3 unique numbers
 - Select corresponding rooms.
 - Repeat for all floors.
2. Describe how to select a **cluster sample** of 30 rooms.

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- Select corresponding rooms.
- Repeat for all floors.

2. Describe how to select a **cluster sample** of 30 rooms.

- Label each floor 1 to 10.
- Take an SRS using RNG(1, 10) for 2 unique #'s.
- Select corresp. floors
- Sample all rooms on these floors.

3. Describe how to select a **systematic random sample** of 30 rooms.

- Label every room from 1 to 150.
- Take a SRS using RNG(1, 150) for 1 number.
- Pick corresponding starting room.
- Select every 5th room from there.

4. Explain a benefit of using each of the three types of sampling methods in this context.

$$\frac{150}{30}$$

3. Describe how to select a **systematic random sample** of 30 rooms.

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- Take a SRS using $RNG(1, 150)$ for 1 number.
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Stratified -

cluster -

Systematic

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4. Explain a benefit of using each of the three types of sampling methods in this context.

Stratified - All floors represented in the sample.

cluster - It's easiest and fastest.

Systematic

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- Label every room from 1 to 150.
- Take a SRS using RNG(1,150) for 1 number.
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4. Explain a benefit of using each of the three types of sampling methods in this context.

Stratified - All floors represented in the sample.

cluster - It's easiest and fastest.

Systematic - Don't have to label every room.
- All floors represented.

Dead trees

In Rocky Mountain National Park, many mature pine trees along Highway 34 are dying due to infestation by pine beetles. Scientists would like to use a sample of size 200 to estimate the proportion of the approximately 5000 pine trees along the highway that have been infested.

(a) Explain why it wouldn't be practical for scientists to obtain an SRS in this setting.

(b) A possible alternative would be to use the first 200 pine trees along the highway as you enter the park. Why isn't this a good idea?

(c) Describe how to select a systematic random sample of 200 pine trees along Highway 34.

**Finish "Dead Trees" and complete
Take home LCQ 4.1**

and consider working on the
Personal Progress Checks

Dead trees

In Rocky Mountain National Park, many mature pine trees along Highway 34 are dying due to infestation by pine beetles. Scientists would like to use a sample of size 200 to estimate the proportion of the approximately 5000 pine trees along the highway that have been infested.

(a) Explain why it wouldn't be practical for scientists to obtain an SRS in this setting.

Every tree would have to be identified and numbered.

(not practical to number every tree along highway and then search for selected trees)

(b) A possible alternative would be to use the first 200 pine trees along the highway as you enter the park. Why isn't this a good idea?

This convenience sampling method is not a good idea because these trees are unlikely to be representative of the popul.

↓ trees more likely damaged near people?
- beetles afraid of people?

(c) Describe how to select a systematic random sample of 200 pine trees along Highway

34.
5000

$$\frac{5000}{200} = 25$$

↑ sample size

- Select every 25th tree walking along highway.

- To choose a starting point, select a number 1 to 25. We would select that tree and every 25th tree thereafter until 200 have been selected.

