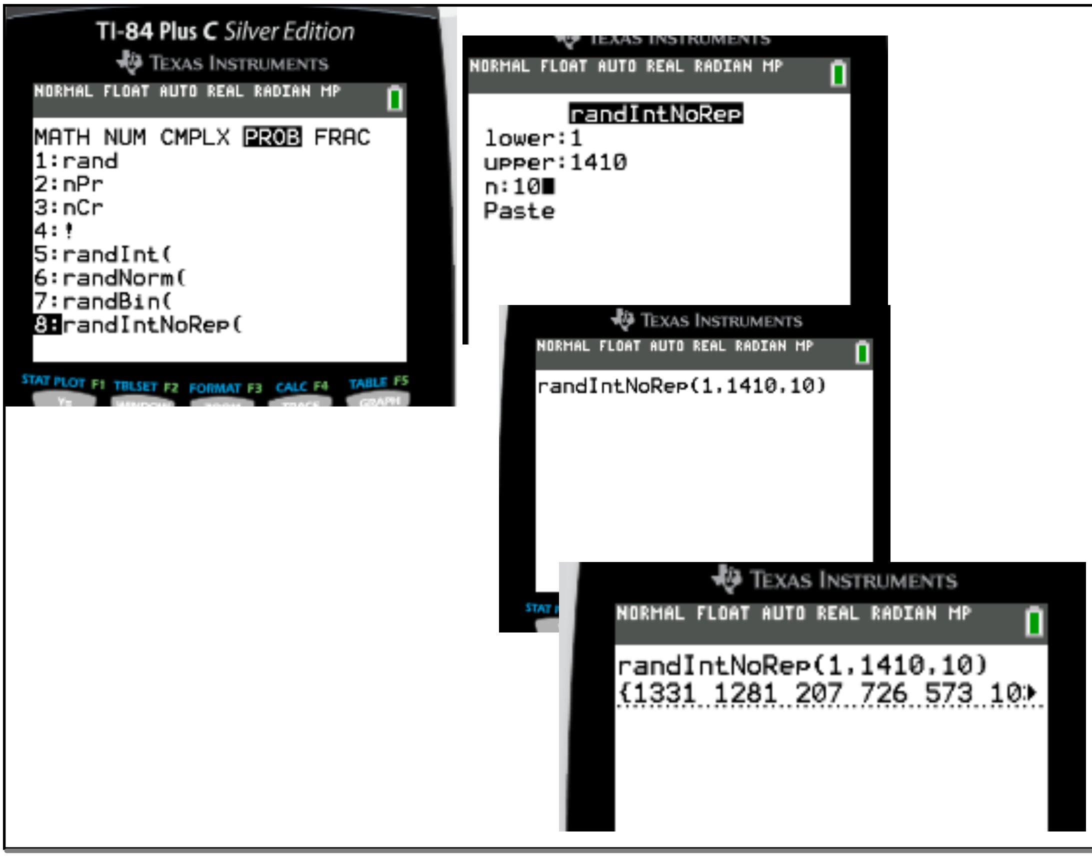
I have copies of detailed solutions for questions 11, 13, and 15 from last night's HW

On question 13, note the details on how to select random integers without repeats on some calculators.

↑ You can pick these up in front


TI-84 Plus C Silver Edition
Texas Instruments
NORMAL FLOAT AUTO REAL RADIAN MP
STAT PLOT F1 TBLSET F2 FORMAT F3 CALC F4 TABLE F5

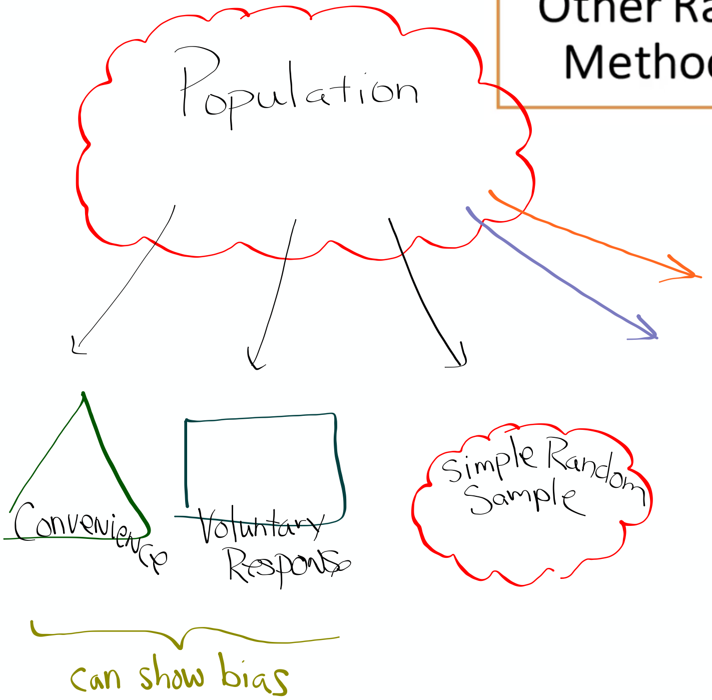
```
MATH NUM CMPLX PROB FRAC
1:rand
2:nPr
3:nCr
4:!
5:randInt(
6:randNorm(
7:randBin(
8:randIntNoRep(
```

```
randIntNoRep
lower:1
upper:1410
n:10
Paste
```

```
randIntNoRep(1,1410,10)
```

```
randIntNoRep(1,1410,10)
{1331 1281 207 726 573 10
```

Other Random Sampling Methods (pages 229–232)


Population
Convenience
Voluntary Response
Simple Random Sample
can show bias

Learning Targets

DESCRIBE how to select a sample using:

- **stratified random sampling** and
- **cluster sampling**

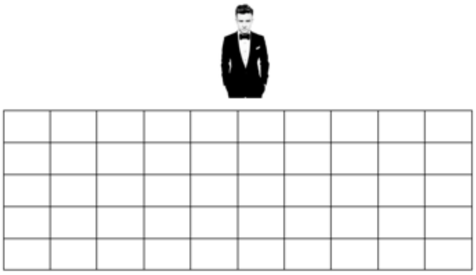
DISTINGUISH stratified random sampling from cluster sampling, and GIVE an advantage of each method.

How Much Do Fans Love Justin Timberlake? (4.1 Day 2A)

Justin Timberlake's concert promoter wants to find out how much fans enjoy the concerts. He will ask fans, "From 1 to 100, where 100 is the most, how much did you enjoy the concert?" The section he wants to survey has 50 seats (5 rows x 10 columns). The stage runs along the northern edge of the venue (where Justin is pictured). He wants to take a sample of 10 seats.

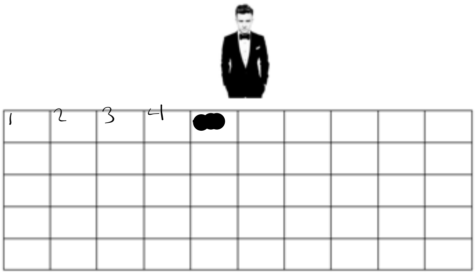
---

1. **Method #1**:
   Take a simple random sample (SRS) of 10 fans. Explain below the steps you used to obtain an SRS.



Let's do together

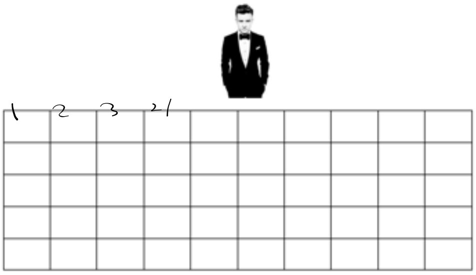
1. **Method #1**:
   Take a simple random sample (SRS) of 10 fans. Explain below the steps you used to obtain an SRS.



① Label all seats, 1-50

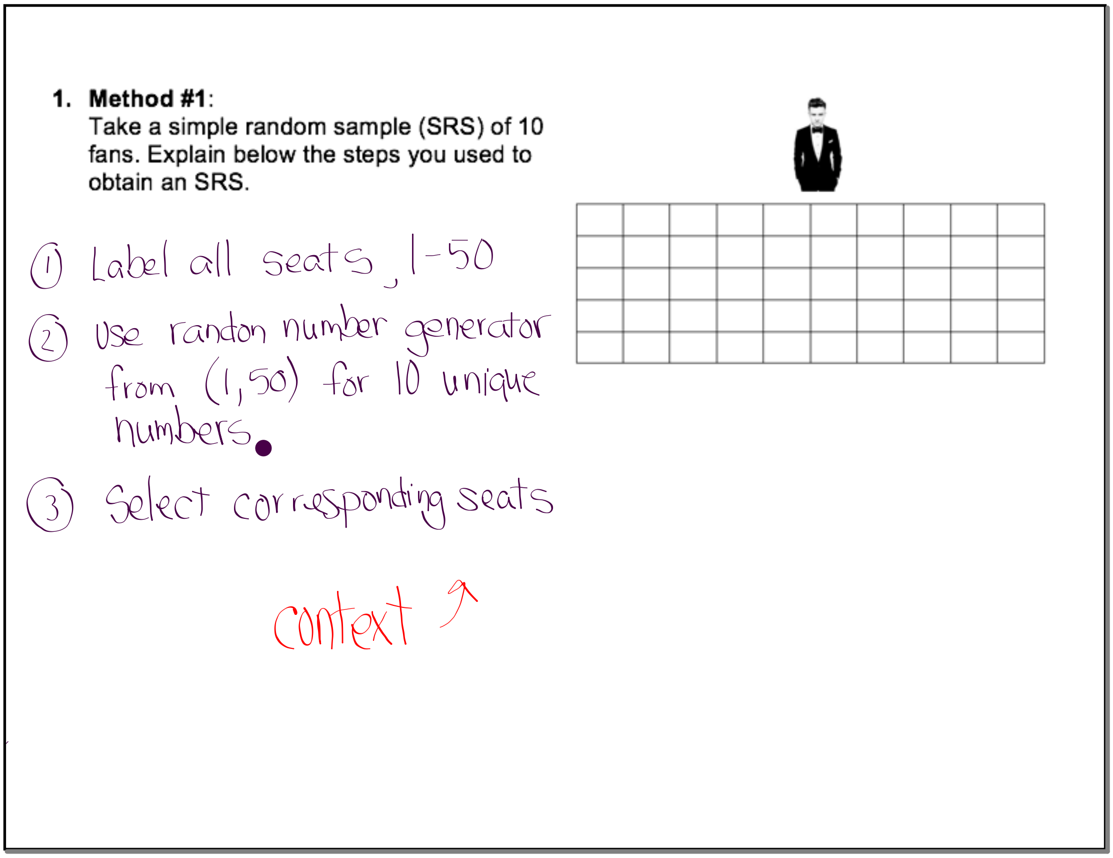
---

1. **Method #1**:
   Take a simple random sample (SRS) of 10 fans. Explain below the steps you used to obtain an SRS.



① Label all seats, 1-50

② Use randon number generator from (1,50) for 10 unique numbers.



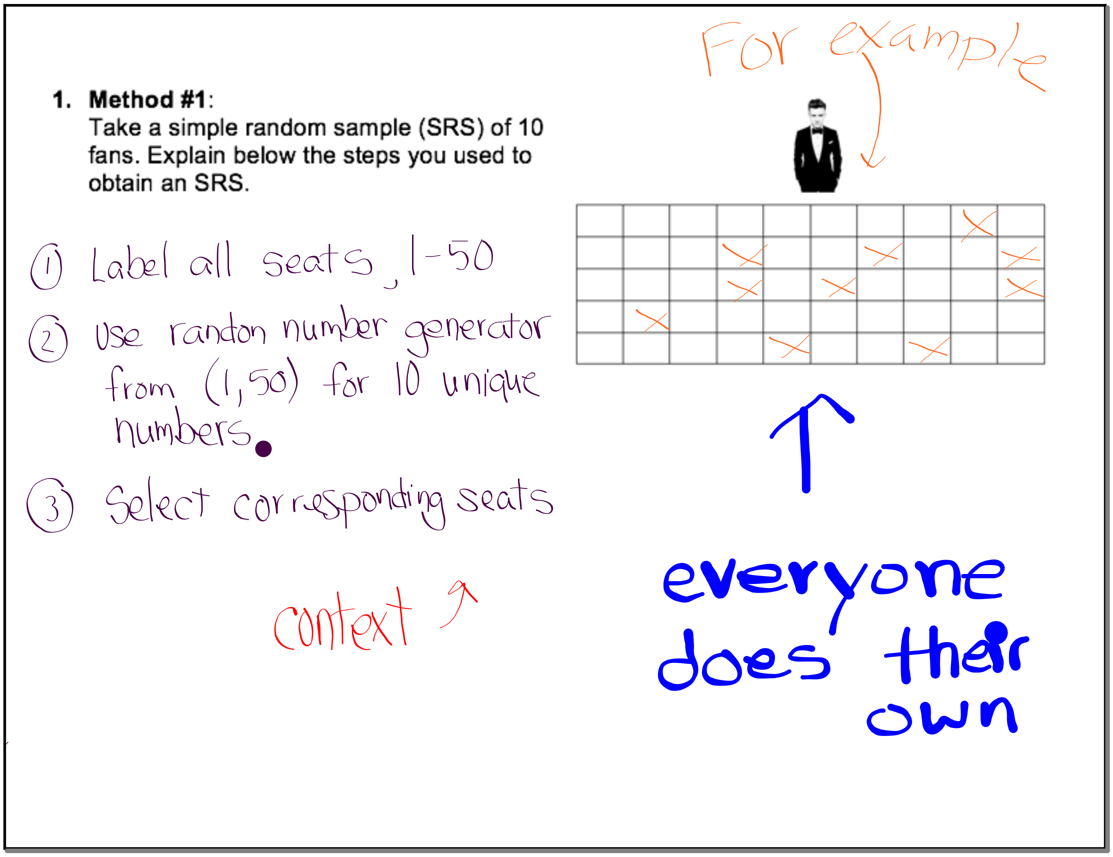
1. **Method #1**:
Take a simple random sample (SRS) of 10 fans. Explain below the steps you used to obtain an SRS.

① Label all seats, 1-50

② Use random number generator from (1, 50) for 10 unique numbers.

③ Select corresponding seats

context ↗



1. **Method #1**:
Take a simple random sample (SRS) of 10 fans. Explain below the steps you used to obtain an SRS.

① Label all seats, 1-50

② Use random number generator from (1, 50) for 10 unique numbers.

③ Select corresponding seats

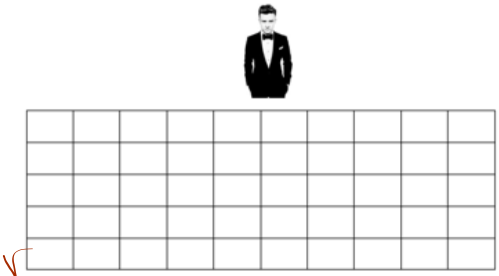
context ↗

For example

↑

everyone does their own

2. **Method #2:**
Randomly choose 2 fans from each horizontal row.

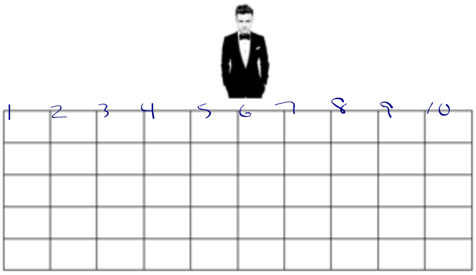


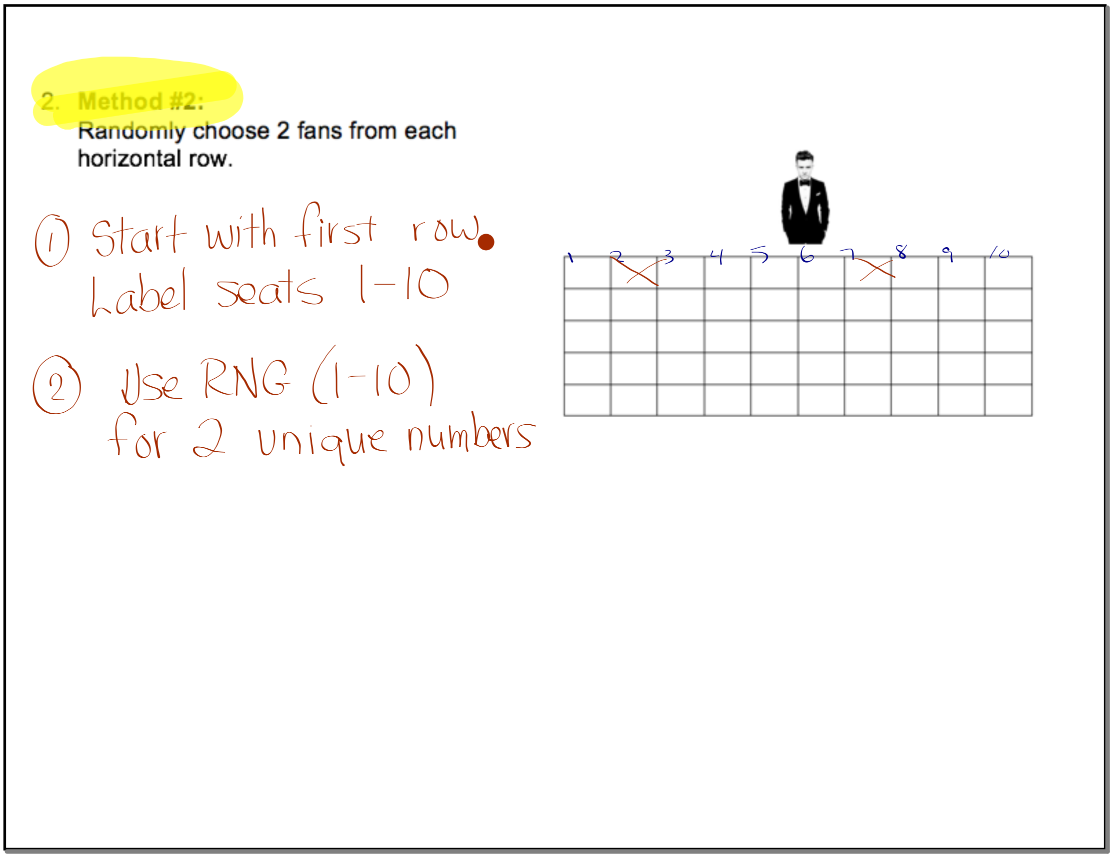
Let's also do this together

---

2. **Method #2:**
Randomly choose 2 fans from each horizontal row.

① Start with first row.
Label seats 1-10



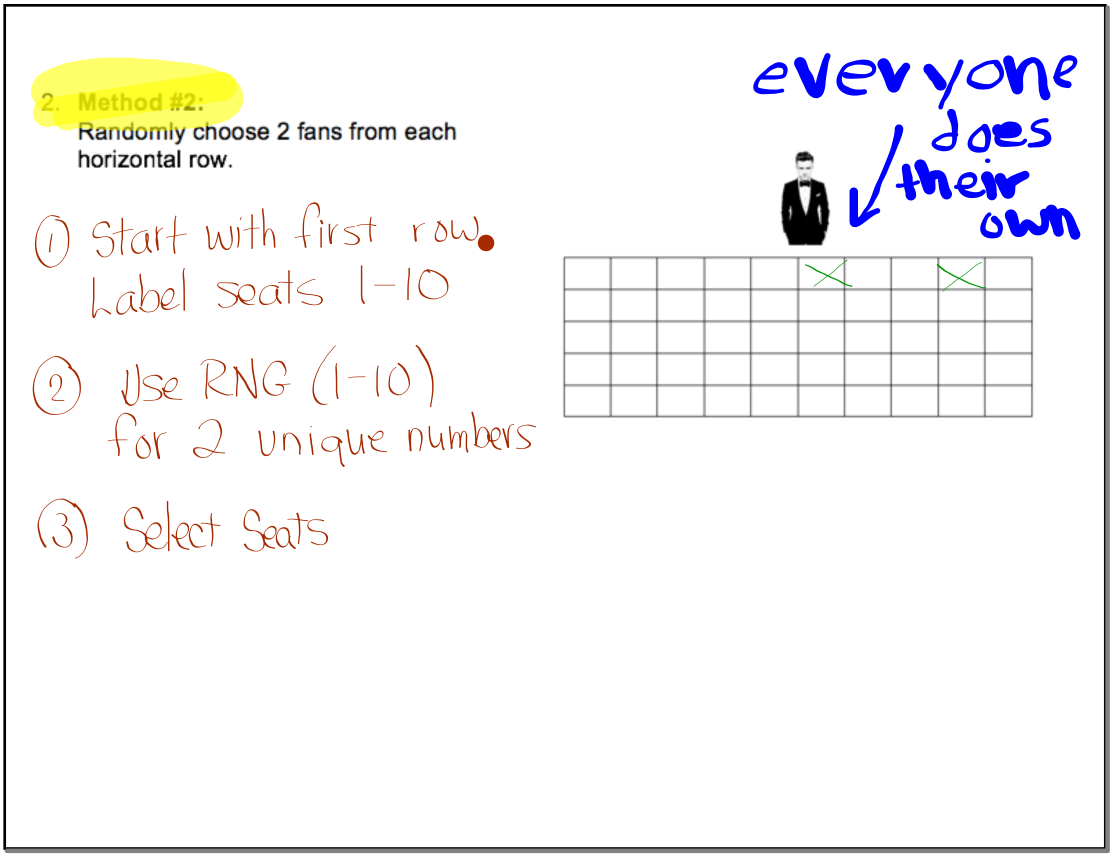


2. **Method #2:**
Randomly choose 2 fans from each horizontal row.

① Start with first row.
Label seats 1-10

② Use RNG (1-10)
for 2 unique numbers

1
2
3
4
5
6
7
8
9
10



2. **Method #2:**
Randomly choose 2 fans from each horizontal row.

① Start with first row.
Label seats 1-10

② Use RNG (1-10)
for 2 unique numbers

③ Select Seats

everyone does their own

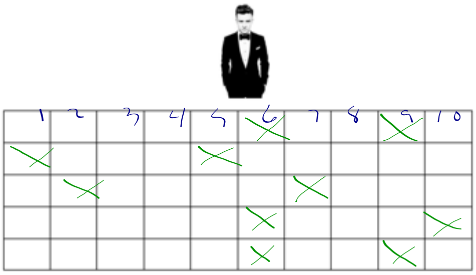
2. **Method #2:**
   Randomly choose 2 fans from each horizontal row.

① Start with first row.
Label seats 1-10

② Use RNG (1-10)
for 2 unique numbers

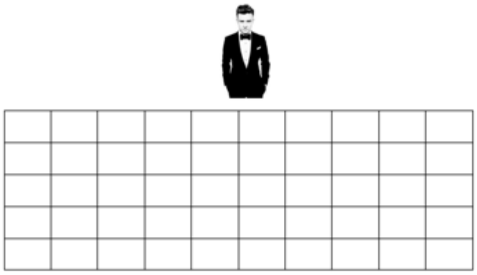
③ Select Seats

④ Repeat with every row



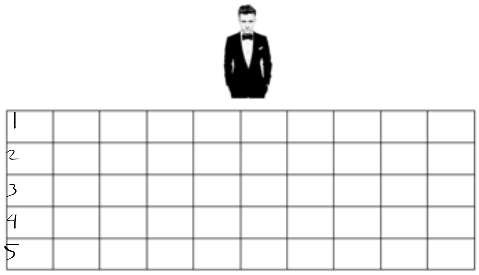
3. **Method #3:**
   Randomly choose 1 fan from each vertical column.

You do



3. **Method #3:**
Randomly choose 1 fan from each vertical column.

① Start with first column
Label seats 1-5



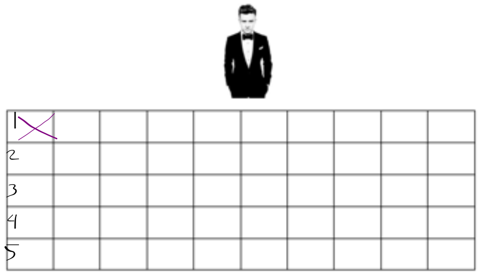
---

3. **Method #3:**
Randomly choose 1 fan from each vertical column.

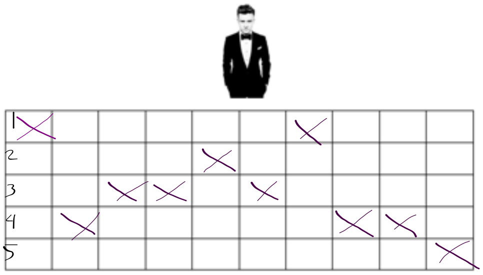
① Start with first column
Label seats 1-5

② Use RNG (1,5) for
1 number

③ Select Seat



3. **Method #3:** Randomly choose 1 fan from each vertical column.



① Start with first column
Label seats 1-5

② Use RNG (1,5) for
1 number

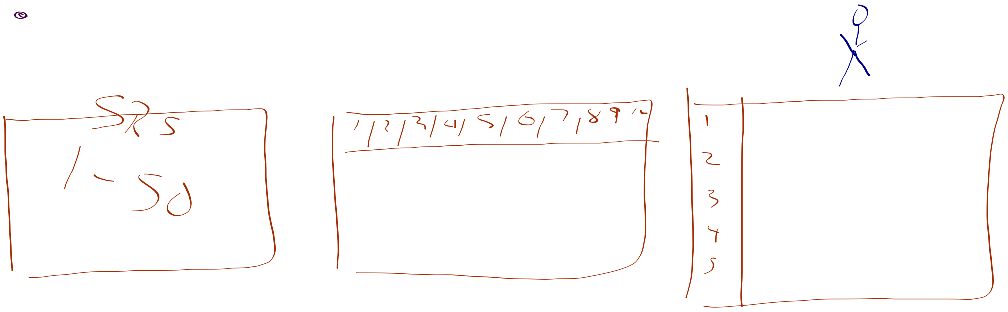
③ Select Seat

④ Repeat with every
column.

---

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

?


SRS
1-50
1/2/3/4/5/6/7/8/9/10
1
2
3
4
5

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

?

The rows because the row seat possibly affects how much you enjoy the show

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.

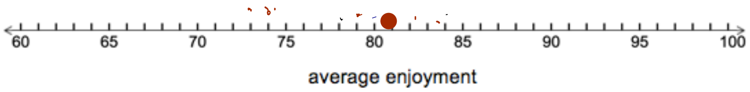
Sample #1: $\bar{x} =$

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

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

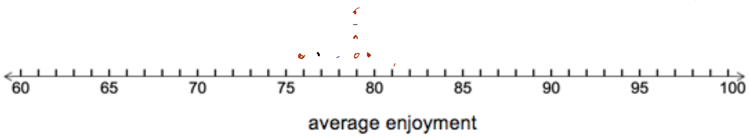
92	89	90	88	95	100	98	93	95	84
82	86	90	88	86	91	90	89	85	83
80	74	80	67	81	82	76	77	74	65
72	68	74	73	70	69	72	70	68	67
69	67	68	68	64	66	63	63	70	68

Method #1: SRS

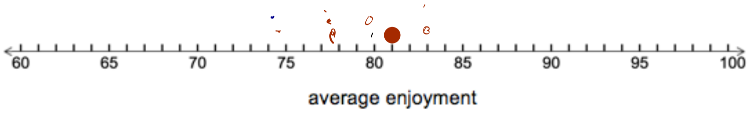


Method #2: Stratify by Row

less variability



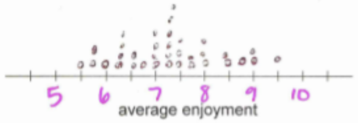
Method #3: Stratify by Column



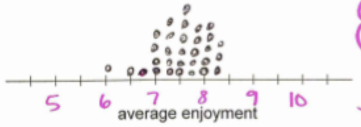
Which had the least variability?

from another class

Simple Random Sample:

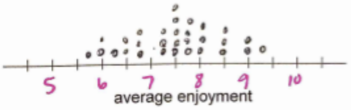


Stratified by Row:



Least variability

Stratified by Column:



choose strata based on characteristics that may affect responses.
→ least variable.

6. Which method was best? Why?

Rows, it was the least variable.
Row affects enjoyment.

Other Random Sampling Methods Day 1

Important Ideas:

Simple Random Sample (SRS)

choose a group from popul.
so every individual and
group has an equal
chance of being chosen.

Other Random Sampling Methods Day 1

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Steps for taking an SRS

① Label ② Randomize

③ Select

Other Random Sampling Methods Day 1

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Stratified Random Sample

= splits popul. into groups (strata) and chooses SRS from each

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Steps for taking an SRS

① Label ② Randomize

③ Select

Stratified Random Sample

= splits popul. into groups (strata) and chooses SRS from each

- Choose strata based on characteristics that may affect responses.

Stratified random sampling works best when the individuals within each stratum are similar with respect to what is being measured and when there are large differences between strata.

Other Random Sampling Methods Day 1

Important Ideas:

Simple Random Sample (SRS)

choose a group from popul. so every individual and group has an equal chance of being chosen.

Steps for taking an SRS

① Label ② Randomize

③ Select

Stratified Random Sample

=splits popul. into groups (strata) and chooses SRS from each

-choose strata based on characteristics that may affect responses.

Cluster Sampling

Cluster Sampling

When populations are large and spread out over a wide area, we'd prefer a method that selects groups (clusters) of individuals that are "near" one another. That's the idea of cluster sampling.

Other Random Sampling Methods Day 1

Important Ideas:

Simple Random Sample (SRS)

choose a group from popul. so every individual and group has an equal chance of being chosen.

Steps for taking an SRS

① Label ② Randomize

③ Select

Stratified Random Sample

- splits popul. into groups (strata) and chooses SRS from each
- choose strata based on characteristics that may affect responses.

Cluster Sampling

split popul into groups based on location (clusters) and use SRS to select clusters.

Other Random Sampling Methods Day 1

Important Ideas:

Simple Random Sample (SRS)

choose a group from popul. so every individual and group has an equal chance of being chosen.

Steps for taking an SRS

① Label ② Randomize

③ Select

Stratified Random Sample

- splits popul. into groups (strata) and chooses SRS from each
- choose strata based on characteristics that may affect responses.

Cluster Sampling

split popul into groups based on location (clusters) and use SRS to select clusters. Sample everyone in cluster.

Cluster sampling works best when the clusters look just like the population but on a smaller scale.

Cluster sampling is often used for practical reasons, like saving time and money.

Check for Understanding

[- prepare to show your steps on side board.]

Check For Understanding: A factory runs 24 hours a day, producing wood pencils on three 8-hour shifts— day, evening, and overnight. In the last stage of manufacturing, the pencils are packaged in boxes of 10 pencils each. Each day a sample of 300 pencils is selected and inspected for quality.

1. Describe how to select a stratified random sample of 300 pencils. Explain your choice of strata.

Check For Understanding: A factory runs 24 hours a day, producing wood pencils on three 8-hour shifts— day, evening, and overnight. In the last stage of manufacturing, the pencils are packaged in boxes of 10 pencils each. Each day a sample of 300 pencils is selected and inspected for quality.

1. Describe how to select a stratified random sample of 300 pencils. Explain your choice of strata.

strata: For each shift (day, evening, overnight) choose 100 pencils.

① Label all pencils 1 to N

② Randomly choose 100 different numbers using RNG (1, N)

③ Select 100 pencils

④ Repeat for all shifts.

2. Describe how to select a cluster sample of 300 pencils. Explain your choice of clusters.

3. Explain a benefit of using a stratified random sample and a benefit of using a cluster random sample in this context.

2. Describe how to select a cluster sample of 300 pencils. Explain your choice of clusters.

Cluster • Boxes of pencils are clusters.

① label every box 1 to N

② Randomly choose 30 diff. numbers. RNG (1,30)

③ Check all pencils in 30 boxes.

3. Explain a benefit of using a stratified random sample and a benefit of using a cluster random sample in this context.

①

② RNG

2. Describe how to select a cluster sample of 300 pencils. Explain your choice of clusters.

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Stratefied:

Cluster:

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Stratefied: We get 100 from every shift
so we get a more precise estimate.

Cluster:

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③ Check all pencils in 30 boxes.

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Stratefied: We get 100 from every shift so we get a more precise estimate.

cluster: Simplifies process. We don't have to label every pencil, just every box.

B.B.

4.1 .... 17, 19, 21, 22, 23, 41

and study pp. 229-232