**AP Stat - Guided Notes 4.1 Sampling and Surveys**

**207–208 (Sampling and Surveys)**

What’s the difference between a population and a sample? What is a census?

**209-211 (How to Sample Badly)**

What’s the problem with convenience samples?

What is bias?

What’s a voluntary response sample? Is this a good method for obtaining a sample?

**Identify** the **sampling** **method** used. Then explain how the sampling method could lead to **bias**.

1. A farmer brings a juice company several crates of oranges each week. A company inspector looks at 10 oranges from the top of each crate before deciding whether to by all the oranges.

**Example**: To estimate the proportion of families that oppose budget cuts to the athletic department, the principal surveys families as they enter the football stadium on Friday night. Explain how this plan will result in bias and how the bias will affect the estimated proportion.

**4.1 Random Sampling Methods**

**211-215**

What’s a simple random sample (SRS)? How can you choose a SRS?

What’s the difference between sampling *with* replacement and sampling *without* replacement? How should you account for this difference when using a table of random digits or other random number generator?

**Example**: Mall Hours

The management company of a local mall plans to survey a random sample of 3 stores to determine the hours they would like to stay open during the holiday season. Use Table D at line 101 to select an SRS of size 3 stores.

Aeropostale Forever 21 Old Navy

All American Burger GameStop Pac Sun

Arby’s Gymboree Panda Express

Barnes & Noble Haggar Payless Shoes

Carter’s for Kids Just Sports Star Jewelers

Destination Tan Mrs. Fields Vitamin World

Famous Footwear Nike Factory Store Zales Diamond Store

Suppose we wanted to estimate the yield of our corn field. The field is square and divided into 16 equally sized plots (4 rows x 4 columns). A river runs along the eastern edge of the field. We want to take a sample of 4 plots.

Using a random number generator, pick a simple random sample (SRS) of 4 plots. Place an X in the 4 plots that you choose.

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 |

 river

Now, randomly choose one plot from each horizontal row. This is called a stratified random sample.

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 2 | 3 | 4 |
| 1 | 2 | 3 | 4 |
| 1 | 2 | 3 | 4 |
| 1 | 2 | 3 | 4 |

 river

Finally, randomly choose one plot from each vertical column. This is also a stratified random sample.

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 |

 river

Which method do you think will work the best? Explain. Now, its time for the harvest! The numbers below are the yield for each of the 16 plots. For each of your three samples above, calculate the average yield.

|  |  |  |  |
| --- | --- | --- | --- |
| 4 | 29 | 94 | 150 |
| 7 | 31 | 98 | 153 |
| 6 | 27 | 92 | 148 |
| 5 | 32 | 97 | 147 |

**Graphing the results:**

Simple Random Sample:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |

 10 70 130

 average yield

Stratified by Row:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |

 10 70 130

 average yield

Stratified by Column:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |

 10 70 130

 average yield

**215**–**217**

What is a stratified random sample? How is it different than a simple random sample?

When is it beneficial to use a stratified random sample? What is the benefit?

**HW #1: page 226 (1, 3, 7, 9)**

**HW #2 page 226 (11, 13, 17, 18, 19)**

**4.1 More about Sampling**

**217**–**219**

What is a cluster sample? Why do we use a cluster sample? How is it different than a stratified sample?

**Example**: A Good Read

A school librarian wants to know the average number of pages in all the books in the library. The library has 20,000 books, arranged by type (fiction, biography, history, and so on) in shelves that hold about 50 books each.

(a) Explain how to select a simple random sample of 500 books

(b) Explain how to select a stratified random sample of 500 books. Explain your choice of strata and one reason why this method might be chosen.

(c) Explain how to select a cluster sample of 500 books. Explain your choice of cluster and one reason why this method might be chosen.

(d) Discuss a potential drawback with each of the methods described above.

**220-221**

What is inference?

* Activity: Results May Vary…Beads

What is a margin of error?

What is the benefit of increasing the sample size?

**221–224**

What is a sampling frame?

What is undercoverage and what problems might undercoverage cause?

What is nonresponse and what problems might nonresponse cause? How is it different than voluntary response?

What is response bias and what problems might response bias cause?

**HW #3: page 228 (21–35 odd)**