Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

River Farm Sampling – Adapted from NCSSM Statistics Leadership Institute, July 2000

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A farmer has just cleared a new field for corn. It is a unique plot of land in that a river runs along one side. The corn looks good in some areas of the field but not others. The farmer decides to harvest a sample of 6 plots of the 36.

**Part I: Sampling**

**A. Method One: Convenience Sample**

The farmer began by choosing the 6 plots that would be easy to harvest. He decided to sample 01, 02, 03, 04, 05, 06 (shaded below) because they are closest to his house.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| #01 | #07 | #13 | #19 | #25 | #31 |
| #02 | #08 | #14 | #20 | #26 | #32 |
| #03 | #09 | #15 | #21 | #27 | #33 |
| #04 | #10 | #16 | #22 | #28 | #34 |
| #05 | #11 | #17 | #23 | #29 | #35 |
| #06 | #12 | #18 | #24 | #30 | #36 |

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Since then, the farmer has had second thoughts about this sample and needs your help. You will still pick 6 plots for your sample. Your job is to determine which of the following methods is best.

**B. Method Two: Simple Random Sample**

Have one group member use their calculator to choose 6 plots to sample. Circle the chosen plots on the grid below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| #01 | #07 | #13 | #19 | #25 | #31 |
| #02 | #08 | #14 | #20 | #26 | #32 |
| #03 | #09 | #15 | #21 | #27 | #33 |
| #04 | #10 | #16 | #22 | #28 | #34 |
| #05 | #11 | #17 | #23 | #29 | #35 |
| #06 | #12 | #18 | #24 | #30 | #36 |

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**C. Method Three: Stratified Sample**

Consider the field as groups in vertical columns. The columns will be the strata. Use a calculator to randomly choose one plot from each vertical column. Circle the chosen plots on the grid below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| #01 | #07 | #13 | #19 | #25 | #31 |
| #02 | #08 | #14 | #20 | #26 | #32 |
| #03 | #09 | #15 | #21 | #27 | #33 |
| #04 | #10 | #16 | #22 | #28 | #34 |
| #05 | #11 | #17 | #23 | #29 | #35 |
| #06 | #12 | #18 | #24 | #30 | #36 |

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**D. Method Four: Stratified Sample**

Consider the field as groups in horizontal rows. The rows will be the strata. Use a calculator to randomly choose one plot from each horizontal row. Circle the chosen plots on the grid below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| #01 | #07 | #13 | #19 | #25 | #31 |
| #02 | #08 | #14 | #20 | #26 | #32 |
| #03 | #09 | #15 | #21 | #27 | #33 |
| #04 | #10 | #16 | #22 | #28 | #34 |
| #05 | #11 | #17 | #23 | #29 | #35 |
| #06 | #12 | #18 | #24 | #30 | #36 |

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**Part II: Calculating Mean Yields**

Now the crops are ready to be harvested. Below is a grid with the yield of corn per plot. Use each sample to estimate the average yield per plot for the four techniques.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 6 | 17 | 20 | 38 | 47 | 55 |
| 7 | 14 | 23 | 34 | 43 | 56 |
| 2 | 14 | 28 | 30 | 50 | 50 |
| 9 | 15 | 27 | 34 | 43 | 51 |
| 4 | 15 | 28 | 32 | 44 | 50 |
| 5 | 16 | 27 | 31 | 48 | 59 |

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A. Convenience Sample

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Plot # | 01 | 02 | 03 | 04 | 05 | 06  Mean Yield Per Plot: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Yield | 6 | 7 | 2 | 9 | 4 | 5 |

B. SRS

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Plot # |  |  |  |  |  | Mean Yield Per Plot: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Yield |  |  |  |  |  |  |

C**.** Vertical Stratified Sample

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Plot # |  |  |  |  |  | Mean Yield Per Plot: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Yield |  |  |  |  |  |  |

D. Horizontal Stratified Sample

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Plot # |  |  |  |  |  | Mean Yield Per Plot: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Yield |  |  |  |  |  |  |

**Part III: Analysis**

1. You have looked at four different methods of choosing plots. Is there a reason, other than convenience, to choose one method over another? Justify your answer.

2. Which sampling method should you use in this case to get a representative sample? Explain why this method best fits the situation.

3. Calculate the actual mean yield per plot for all 36 plots. Are the means for your samples similar or very different from the actual mean? Does your answer for #2 change or stay the same with this information?

4. The next year, the farmer installs an irrigation system. Here are the yields for each plot. Which sampling method do you think would be reliable now and why?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 79 | 81 | 95 | 69 | 65 | 59 |
| 80 | 75 | 88 | 80 | 82 | 66 |
| 97 | 50 | 92 | 92 | 81 | 84 |
| 99 | 71 | 55 | 75 | 65 | 66 |
| 57 | 95 | 51 | 79 | 89 | 71 |
| 69 | 95 | 68 | 90 | 93 | 97 |

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