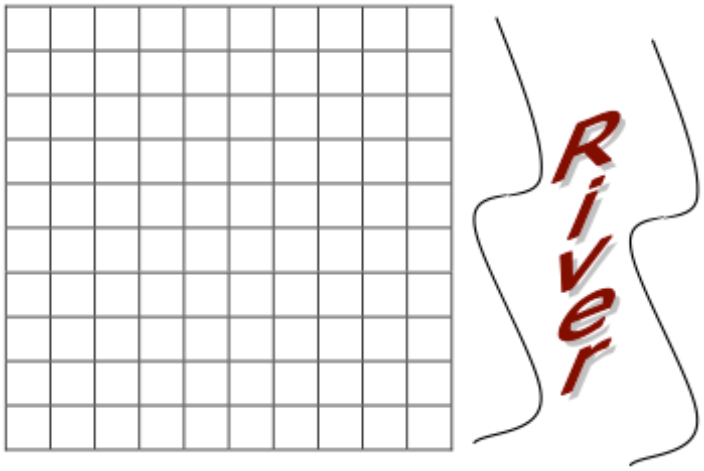
An Exercise in Sampling: Rolling Down the River

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 is not sure that harvesting the field is worth the expense. He has decided to harvest 10 plots and use this information to estimate the total yield. Based on this estimate, he will decide whether to harvest the remaining plots.

A. Method Number One: Convenience Sample

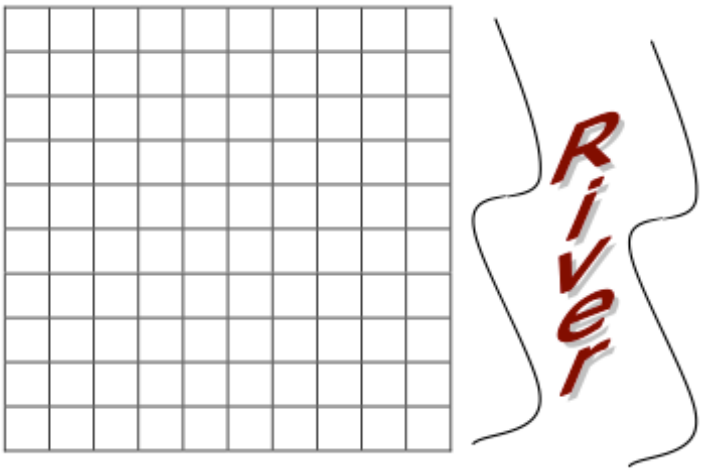
The farmer began by sampling plots easy to access. He drove his tractor out of the barn and sampled 10 contiguous plots, driving only horizontally or vertically. He may have driven over previously sampled plots, but he did not travel through a plot without sampling it. Mark 10 plots the farmer may have used.



Since then, the farmer had second thoughts about this selection and has decided to come to you (knowing that you are an AP statistics student, somewhat knowledgeable, but far cheaper than a professional statistician) to determine the approximate yield of the field. You will still be allowed to pick 10 plots to harvest early. Your job is to determine which of the following methods is the best one to use – and to decide if this is an improvement over the farmer's original plan.

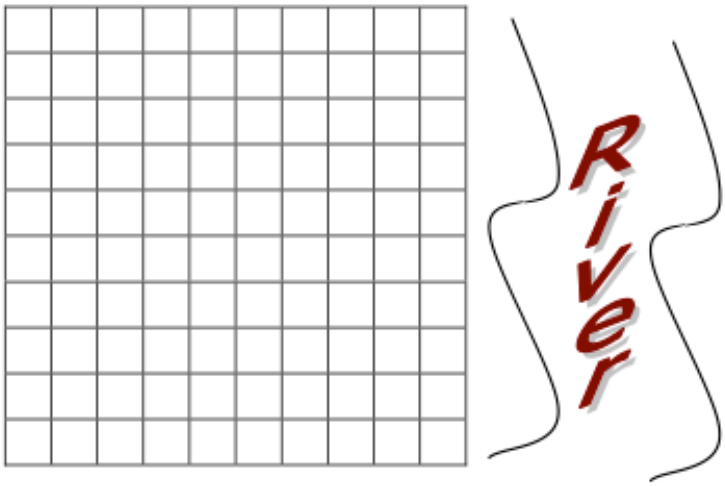
B. Method Number Two: Simple Random Sample

Use your calculator or a random number table to choose 10 plots to harvest. Mark them on the grid below, and describe your method of selection.



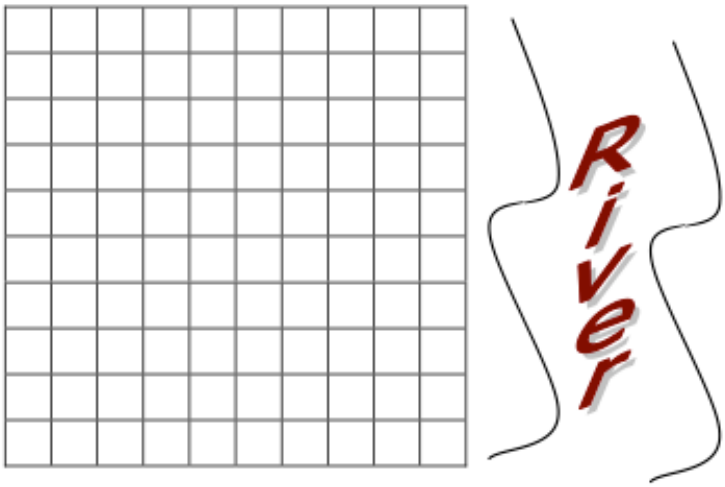
C. Method Number Three: Stratified Sample

Consider the field as grouped in vertical columns (called strata). Using your calculator or a random number table, randomly choose one plot from each vertical column and mark these plots on the grid.



D. Method Number Four: Stratified Sample

Consider the field as grouped in horizontal rows (also called strata). Using your calculator or a random number table, randomly choose one plot from each horizontal row and mark these plots on the grid.



OK, the crop is ready. Your teacher will show you the actual yields in the field. Estimate the average yield per plot based on each of the four sampling techniques.

Sampling Method	Mean yield per plot	Estimate of total yield
Convenience Sample (farmer's)		
Simple Random Sample		
Vertical Strata		
Horizontal Strata		

Observations:

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

2) How did your estimates vary according to the different sampling methods you used?

3) Which sampling method should you use? Why do you think this method is best?

4) How could the farmer take a ***cluster sample*** in this activity?

(Adapted from NCSSM Statistics Leadership Institute, July, 2000)

Actual Yields in the field: (show students AFTER they have chosen their samples)

6	17	20	38	47	55	69	76	82	97
7	14	23	34	43	56	63	75	81	92
2	14	28	30	50	50	62	80	85	96
9	15	27	34	43	51	65	72	88	91
4	15	28	32	44	50	64	76	82	97
5	16	27	31	48	59	69	72	86	99
5	18	28	34	50	60	62	75	90	90
8	15	20	38	40	54	62	77	88	93
7	17	29	39	44	53	61	77	80	90
7	19	22	33	49	53	67	76	86	97