

Chapter 2: Collecting Data

Name _____

1. Bias, the tendency for samples to differ from the corresponding population in some systematic way, might be due to: (a) selection bias, (b) response bias, and/or (c) nonresponse bias. In a few sentences, discuss the differences among these different biases. Examples may illustrate, but not substitute for, a discussion.

2. An anthropologist is studying the strength of fragments of pottery (“sherds”) found in three archeological sites in the Phoenix Basin area of Arizona. Her study involves applying force to the sherds until they break; therefore she plans to utilize only a small sample of the artifacts. Her data contains the location of the sherd (site), and the weight and thickness of the sherd. A partial list of the data is shown below.

Sherd #	Site	Weight (g)	Thick (mm)
1	Sacaton	14.7	5.41
2	Sacaton	14.6	5.75
3	Gila Plain	17.9	7.09
4	Sacaton	14.7	6.14
5	Gila Plain	13.1	5.11
6	Casa Grande	18.5	6.51
7	Casa Grande	13.4	5.92
...
1000	Gila Plain	14.6	4.01

- a) Briefly describe a process to select a simple random sample of size $n = 20$ from this list of sherds, using a random number table.

- b) Briefly describe how a stratified random sample could be selected with strata corresponding to archeological sites.

3. The following paragraph describes a study. Is it an observational study or an experiment? Justify your answer with specific references to the information in the study.

"We compared paired daytime and night counts of wild brook trout, brown trout, and rainbow trout made by the same snorkelers in five streams during August. Overall, we counted 109 trout in the daytime and 333 trout at night. We speculate that trout counted at night were present during the daytime but were hidden from view. Biologists should consider that trout behavior and visibility might vary between daytime and night, even during summer. In some streams, the majority of trout may not be seen during the daytime."

4. In competitive sports coaches may record athletes' practice sessions to provide more effective feedback to the athlete. Some coaches believe video recording may make the athletes more nervous and actually decrease their performance. You have been asked to design an experiment to address this issue for competitive high school tennis players, specifically addressing the proportion of successful first serves. The subjects for the experiment are 60 high school male competitive tennis players of varying ability who have volunteered for the experiment.
- a) Describe the treatment(s) in your experiment
- b) The experience levels of the players is one possible confounding variable is. In a few sentences, explain how you would control this variable.
- c) Can the results of this experiment be generalized to all male tennis players? Why or why not?