1. A study of the effect of living in public housing on family stability and other variables in poverty-level households was carried out as follows:

The researchers obtained a list of all applicants for public housing during the previous year. Some applicants had been accepted, while housing authority had turned down the others. Both groups were interviewed and compared.

(a) Observational study or experiment? Why? observational study - no treatment

(b) If this is an observational study, prospective or retrospective? If this is an experiment, what are the treatments?

(c) What are the explanatory and response variables? accepted into housing or not family stability + other variables

2. 300 graduate students in psychology volunteer to be subjects in an experiment whose purpose is to look at the effect that both dosage level and type of drug have on a performance task. There are 4 levels of drug to be tested: placebo, 200mg, 500mg, 750mg. There are two types of drugs to be tested as well: A and B. We will be measuring the students' scores on the performance task.

a. Observational study or experiment?

b. What are the explanatory variables? (there are 2 of them) drug + dosage

c. What is the response variable? scores on performance task

d. Who are the individuals/subjects? 300 grad students in psychology

e. What are the treatments? (there are 8 of them)

   A-placebo A-200 A-500 A-750
   B-placebo B-200 B-500 B-750

f. Design a completely randomized experiment:

   * = compare scores on perf task

   !intelligence
   - skill on task before drug
   - gender
3. The following people (listed by last name) are selected by a good sampling method to be in a Randomized Comparative Experiment. We want to assign them to a treatment or a control group.

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suggs</td>
<td>Tapp</td>
</tr>
<tr>
<td>Dunn</td>
<td>Deitrich</td>
</tr>
<tr>
<td>Reynolds</td>
<td>Collins</td>
</tr>
<tr>
<td>Moreland</td>
<td>Brown</td>
</tr>
<tr>
<td>Imon</td>
<td>Hill</td>
</tr>
<tr>
<td>Rogers</td>
<td>Hyman</td>
</tr>
<tr>
<td>Gray</td>
<td>Lockart</td>
</tr>
</tbody>
</table>

Use the Table of Random Digits below for this assignment:

0949 5657218104 64428101217 75250395111190598517233273
41942914018160938117594058849118079297848149985390
88512012341411756884771075302302243264155223312818
82868599884232396542967330005674887219144830096404

* 1st 12 go to treatment - rest to control

4. Is the right hand generally stronger than the left hand in right-handed people? You can crudely measure hand strength by placing a bathroom scale on a shelf with the end protruding, then squeezing the scale between the thumb (below) and the four fingers (above). The reading of the scale shows the force exerted. You use 15 right-handed people (both men and women) as subjects, all between the age of 20 and 30. You measure the difference between the two hand strengths (right hand – left hand strength, thus positive difference shows right hand stronger, negative difference shows left hand stronger)

(a) What are the explanatory and response variables?

(b) Who are the individuals/subjects?

(c) What are the treatments?

(d) What are some lurking variables?

(e) Describe the design of a matched pairs experiment to compare the strength of the right and left hands. (draw a picture)
(f) How could you change your design to study the strength of the dominant hand of a person compared to their non-dominant hand? (In other words, how could you alter your experiment to include left-handed people, and the comparison between the strength of their left hands to their right hands) You want to study both left and right handed people, and the difference between their dominant hands and their non-dominant hands (in the same manner as the original study). You want to use a sample of 15 left-handed and 15 right-handed people, both men and women in both samples. (Draw a picture)

30 Subjects

15 left-handed
men

15 right-handed
men

5. In using the Table of Random Digits in the back of the book repeatedly to choose samples or do experimental randomization, you should not always begin at the same place, such as line 101. Why not?
   you wouldn't always have the same chance of selecting
   an exp. unit. Not random!

6. True or false, about the Table of Random Digits:
   a. There are always four 0’s in every set of 40 numbers  F
   b. The chance of selecting 00 is 1/99  F  it's 1/100
   c. 0000 can never occur in the table, because this is not random  F

7. A newspaper article about an opinion poll says “43% of Americans approve of the President's overall job performance during his term in office.” Toward the end of the article you read: “The poll is based on unbiased telephone interviews with 1210 adults from around the United States, excluding Alaska and Hawaii. The adults were selected at random from a list of registered voters who listed their telephone numbers on their registration”

(a) What is the population? The sample?
   American adults

(b) Discuss the problems with this sample survey. Also, what improvements would you make?
   - better sampling frame
   - not do phone interviews
   - include Alaska and Hawaii
   - undercoverage - only those with phones
   - undercoverage - excludes Alaska & Hawaii
   - undercoverage - only registered voters w/ phone #s listed
   - nonresponse - some people might not pick up phone or might hang up
8. A researcher wants to sample high schools in the United States. He is looking to determine the average weekly income and curfew for high school students. He decides that the grade that the students are in will have a large effect on their responses and he wants to take this into account. He obtains a list from the government of all certified high schools in the country (private and public). How would you create an appropriate sample for him to analyze? (Use both stratified and multistage sampling methods)

- select 2 High Schools from each county (SRS)
- In each high school, separate students into grades (get a list of each) and select an SRS of students in each grade

9. A management student takes a survey of student attitudes toward part-time work while attending college. He asks a large group of randomly selected students from numerous colleges and finds that 67% of them have a positive attitude toward part-time work while in college.

(a) In this situation what is the statistic? 67%
(b) In this situation, what is the parameter of interest?

10. It is known that in a specific city the chance that a person has a special gene marker for breast cancer is 14%. A researcher wants to conduct a study of 5 people with these markers. How large of a sample will he need to take from the population of the city to make sure he has 5 subjects with the gene marker? Write instructions for a simulation and conduct three trials. Clearly label each trial and state conclusion.

Events: breast cancer gene or not
Use TRD as generator
00-13 = has gene
14-99 = doesn't have gene
Go until you have 5 people w/ the gene
Do 3 trials total
Record # people in each trial

Based on the 3 trials, you would need on average 28 people to have 5 w/ the gene
11. A company employs 14 executives, 35 juniors executive, 50 secretarial staff, and 100 case managers. In an effort to keep informed about possible employee discontent, the company decides to take a random sample of its employees every 6 months, asking questions about job satisfaction.
   a. Discuss how you would implement an SRS in this situation
      
      Give everyone a # from $1-199$, and randomly select a certain # of these people, using IRD or calculator software.
   
   b. Discuss how you would implement a stratified random sample in this situation
      
      Separate the 199 employees into executives, junior execs, secretaries, and case managers. Take an SRS of 8 execs, 4 junior execs, 50 secretaries and 10 case managers. This total of 21 people would be your sample.
   
   c. Discuss how you would implement a systematic sample in this situation
      
      Wait outside the building one morning and select every 5th person who walked in, and interview them.
   
   d. Discuss how you would implement a cluster sample in this situation
      
      Pick one floor of the office building and interview everyone on that floor.

12. What are the 3 principles of experimental design?

   1) Randomization  2) Replication  3) Control

13. What does “statistically significant” mean?

   Observing an effect (or response, or difference) so often, that it could not be just chance. Must be a real conclusion.

14. What are lurking variables?

   A variable that has an effect on the response variable that was not in our study/expt.

15. What is the difference between bias and variability?

   Accuracy  Precision

16. Draw a histogram that has high bias, but low variability.

17. Draw a histogram that has low bias but high variability.