Chapter 8 Solutions

8.1: (a) The population is (all) college students. (b) The sample is the 104 students at the researcher's college who returned the questionnaire.

8.2: The population is all the artifacts discovered at the dig. The sample is those artifacts (2% of the population) that are chosen for inspection.

8.3: (a) The population is all 45,000 people who made credit card purchases. (b) The sample is the 137 people who returned the survey form.

8.4: It is a convenience sample; she is only getting opinions from students who are at the student center at a certain time of day. This might underrepresent some group: commuters, graduate students, or nontraditional students, for example.

8.5: Since all the students surveyed are enrolled in a special senior honors class, these students may be more likely to be interested in joining the club (and more willing to pay $35 to do so). The direction of bias is likely to overestimate the proportion of all psychology majors willing to pay to join this club. This is a convenience sample.

8.6: Number from 01 to 30 alphabetically (down the columns). With the applet: Population = 1 to 30, select a sample of size 4, then click Reset and Sample. With Table B, enter at line 122 and choose 13 = Crestview, 15 = Fairington, 05 = Brandon Place, and 29 = Village Square.

8.7: Number from 01 to 26 alphabetically (down the columns). With the applet: Population = 1 to 26, select a sample of size 5, then click Reset and Sample. With Table B, enter at line 134 and choose 16 = Ippolito, 18 = Jung, 13 = Gupta, 21 = Modur, and 04 = Bonds.

8.8. (a) Assign five-digit labels to each record, from 00001 to 55914. (b) With Table B, enter at line 120 and choose 35476, 39421, 04266, 35435, and 43742.

8.9: With the election close at hand, the polling organization wants to increase the accuracy of its results. Larger samples provide better information about the population.

8.10: The sample size for the general public is larger than the sample size for Pentecostals. Larger samples yield more information, which means more accuracy, which means a smaller margin of error.

8.11: Label the suburban townships from 01 to 30, down the columns. With Table B, enter at line 105 and choose 29 = Wheeling, 07 = Elk Grove, 19 = Orland, 14 = New Trier, and 17 = Norwood Park. Next, label the Chicago townships from 1 to 8, down the columns. With Table B, enter at line 115 and choose 6 = Rogers Park, 1 = Hyde Park, and 4 = Lake View.

8.12: Label the students in each class as shown in the table below. If Table B (starting at line 122) is used to choose the samples, the students selected are those listed in the table.

Class	Labels	First five students in sample
Freshmen	0001 to 1127	0529, 0908, 0815, 0727, 1025
Sophomores	001 to 989	602, 755, 892, 330, 634
Juniors	001 to 943	184, 281, 868, 710, 350
Seniors	001 to 895	143, 367, 494, 271, 758

8.13: The higher no-answer was probably the second period—more families are likely to be gone for vacations, or to be outside enjoying the warmer weather, and so on. Nonresponse of this type might underrepresent those who are more affluent (and are able to travel). In general, high nonresponse rates always make results less reliable, because we do not know what information we are missing.

8.14: Question A asks whether existing law should be overturned. Question B simply asks whether openly gay men and women should be allowed to serve. Anybody who answers "yes" to Question A would surely answer "yes" to Question B, but the converse is not true. Hence, Question A is slanted toward a more negative response on gays in the military.

8.15: (a) and (b) Features will vary depending on the website chosen. (c) The weakness of any online poll is that it relies on voluntary response. Most online poll samples are not representative of any larger population of use or interest to the researcher.

8.16: Answers will vary. One possible answer follows. (a) One might guess that the population of people that own only a cell phone and no landline phone is more likely to regularly text, and would therefore be more likely to approve of texting while driving. (b) As explained, this group would be more supportive of texting while driving, so the sample percentage that favors making texting while driving illegal would decrease. (c) This is, indeed, bias. We're likely to overestimate the percentage of all adults that favor making texting while driving illegal.

8.17: (a) all customers who have purchased something in the last year.

8.18: (b) the 152 voters returning the questionnaire.

8.19: (b) 5458, 0815, 0727, 1025, 6027.

8.20: (b) the poll uses voluntary response, so the results tell us little about the population of interest.

8.21: (b) a stratified random sample (plots are stratified by terrain).

8.22: (a) 001, 002, 003, …, 439, 440. Each member of the population needs a 3-digit label, and we need 440 of them (not 441, as in (b)).

8.23: (c) 04, 18, 07, 13, 02, 05. (Notice that in (b) "07" appears in the sample twice.)

8.24: (b) undercoverage.

8.25: (b) The result for the entire sample is more accurate because both come from the same sample.

8.26: The population is all adults, aged 18 and older, living in the United States. The sample consists of the 1,014 adults randomly selected.

8.27: The population is the 1000 envelopes stuffed during a given hour. The sample is the 40 envelopes selected.

8.28: Numbering from 01 to 35 alphabetically (down the columns), we enter Table B at line 131 and choose 05 = Burke, 32 = Vore, 19 = Kessis, 04 = Bower, 25 = Prince, 29 = Shoepf, 20 = Lu, and 16 = Heaton. (Note: Using the table, "19" comes up a few times. After the first time "19" appears, it needs to be discarded for an alternate value.)

8.29: With the applet: Population = 1 to 287, select a sample of size 20, then click Reset and Sample. Using Table B, number the area codes 001 to 287. Then, enter at line 135, and pay attention to the instructions that if we use the table, we'll pick only 5 numbers. The selected area codes are 255, 100, 120, 126, 008.

8.30: (a) Assign labels 0001 through 1410. (b) Beginning at line 105, we choose plots 0769, 1315, 0094, 0720, and 0906.

8.31: (a) Alphabetize the 6168 names (using middle initials or a student ID to distinguish between two people with the same name). Label these students with an ID 0001 to 6168. (b) Using Table B, entering at line 135, the sample is 5556, 5839, 1007, 1120, 1513, 1260, 0842, and 1447.

8.32: If one always begins at the same place, then the results would not really be random.

8.33: (a) False. Such regularity holds only in the long run. If it were true, you could look at the first 39 digits and know whether or not the 40th digit was a 0. (b) True. All pairs of digits (there are 100, from 00 to 99) are equally likely. (c) False. Four random digits have chance 1/10,000 to be 0000, so this sequence will occasionally occur. The sequence 0000 is no more or less random than 1234 or 2718, or any other four-digit sequence.

8.34: (a) The population is (something like) adult residents of the United States. (b) The nonresponse rate is 1169/2000 = 58.45%. (c) This question will likely have response bias; specifically, many people will give an inaccurate count of how many movies they have seen in the past year.

8.35: Online polls, call-in polls, and voluntary response polls in general tend to attract responses from those who have strong opinions on the subject, and therefore are often not representative of the population as a whole. On the other hand, there is no reason to believe that randomly chosen adults would over-represent any particular group, so the responses from such a group give a more reliable picture of public opinion.

8.36: The response rate was 5029/45,956 = 0.1094, so the nonresponse rate was 0.8906 = 89.1%.

8.37: (a) Assign labels 0001 through 5024, enter the table at line 104, and select: 1388, 0746, 0227, 4001, and 1858. (b) More than 171 respondents have run red lights. We would not expect very many people to claim they *have* run red lights when they have not, but some people will deny running red lights when they have.

8.38: People likely claim to wear their seat belts because they know they should; they are embarrassed or ashamed to say that they do not always wear seat belts. Such bias is likely in most surveys about seat belt use (and similar topics).

8.39: (a) Each person has a 10% chance: 4 of 40 men, and 3 of 30 women. (b) This is not an SRS because not every group of 7 people can be chosen; the only possible samples are those with 4 men and 3 women.8.40: Label the members of District 1 001, 002, …, 997. Label those of District 2 001, 002, …, 803. Continue in like manner for each district. Now, to sample 5 members from District 1, using Table B, entering at line 122, our sample is: 138, 738, 159, 895, and 052. To sample 5 members from District 2, using Table B, entering at line 131, our sample is: 050, 071, 663, 281, and 194. We use different lines so that the samples will be independent.

8.41: Sample separately in each stratum; that is, assign separate labels, then choose the first sample, then continue on in the table to choose the next sample, etc. Beginning with line 102 in Table B, we choose:

Forest type	Labels	Parcels selected
Climax 1	01 to 36	19, 27, 26, 17
Climax 2	01 to 72	09, 55, 32, 22, 69, 56, 52
Climax 3	01 to 31	13, 07, 02
Secondary	01 to 42	27, 40, 01, 18

8.42: (a) The sample size for the public is much larger, so the survey is more accurate for this group. (b) It's likely that people working health-related fields have opinions that differ from those of the public. The researchers probably want to examine this.

8.43: (a) Since 200/5 = 40, we will choose one of the first 40 names at random. Beginning on line 120, the addresses selected are 35, 75, 115, 155, and 195. (Only the first number is chosen from the table.) (b) All addresses are equally likely; each has chance 1/40 of being selected. To see this, note that each of the first 40 has chance 1/40 because one is chosen at random. But each address in the second 40 is chosen exactly when the corresponding address in the first 40 is, so each of the second 40 also has chance 1/40. And so on. This is not an SRS because the only possible samples have exactly one address from the first 40, one address from the second 40, and so on. An SRS could contain any 5 of the 200 addresses in the population. Note that this view of systematic sampling assumes that the number in the population is a multiple of the sample size.

8.44: (a) This design would omit households without telephones, those with only cell phones, and those with unlisted numbers. Such households would likely be made up of poor individuals (who cannot afford a phone), those who choose not to have phones, and those who do not wish to have their phone numbers published. (b) Those with unlisted numbers would be included in the sampling frame when a random-digit dialer (RDD) is used. (Additionally, RDDs exclude cell phones, although students may not be aware of this fact. For a discussion of this issue, see http://www.mysterypollster.com/main/2004/10/arianna_huffing.html.)

8.45: (a) Automated random digit dialing is a fast, economical way to randomly dial landline telephone numbers. (b) In some families, the adult that answers the phone regularly may be systematically different from an adult that does not. For example, people not working at a job may be at home more often, and therefore may be more likely to answer the phone. (c) There could be (and probably are) big differences between landline phone users and cellular phone users. The design in question is a stratified sample.

8.46: (a) The wording is clear, but will almost certainly be slanted toward a high positive response. (Would anyone hear the phrase "brain cancer" and *not* be inclined to agree that a warning label is a good idea?) (b) The question makes the case for a national health care system, and so will slant responses toward "yes." (c) This survey question is most likely to produce a response similar to: "Uhh...yes? I mean, no? I'm sorry, could you repeat the question?" (And, if the person is able to understand the question, it is slanted in favor of day-care subsidies.)

8.47: Answers will vary considerably. See the textbook for several examples. (a) One example: "Should colleges do away with the 'tenure' system, which effectively allows lazy and incompetent faculty members to stay in highly-paid, easy, taxpayer-funded jobs?" (b) On example: "Do you regularly look at online pornography?"

8.48: In Canada, as in many places, elected officials aren't necessarily qualified. In this case, the Minister is terribly misguided. Critics of the proposal are worried that the sample will not be representative of the population — presumably because people that fill out the optional long-form questions will be systematically different from those that don't. Larger samples do not address such problems of bias.

8.49 and 8.50 are Web-based exercises.