Math 105 - Math in Modern Society

Chapter 13 Solutions

Sept. 29, 2010

17. (a) Since the Cleansburg Planning Department wants the opinion of people in the city on a topic, the target population is the people of the city of Cleansburg.

    (b) The sampling frame does not represent the target population, since the sampling frame is just the people who pass by one of the targeted corners in the evenings.

18. (a) The sample size is $n = 1788$, since everyone who was asked the question of whether they wanted to respond to survey counts as part of the sample. Only the people who were in the sampling frame that the surveyers didn't talk to at all count are not in the sample.

    (b) The number of respondents was 475, so the response rate is

$$\text{response rate } = \frac{\text{number of respondents}}{\text{total sample size}} = \frac{475}{1788} = 0.266 \text{ or } 26.6\%.$$

19. (a) Since the interviewer each picked different street corners in the city, we can probably assume that people from different parts of the city think differently about the downtown mall.

    (b) It makes sense that interviewer D picked a downtown street corner, since that street corner got the highest percentage of "yes" votes. It would stand to reason that the people who frequent the downtown (and would be likely to hanging around there in the evenings) would like to see the mall there revitalized.

    (c) Yes, because it only asks the opinion of people who are likely to be out in the evenings, for example.

    (d) This was not quota sampling. It could be argued that this is stratified sampling, except that the strata (the street corners) were not chosen randomly, but at the convenience of the interviewers. But they did not calculate the total number of passers-by at each street corner and adjust the samples taken at each corner accordingly. Instead, they got 100 responses from each street corner.

20. This is basically an opinion question, but you should support your answer with good reasons.

25. (a) This is quota sampling. Fifty percent of the orchard is variety A, as is 50% of the sample. Similarly, 25% of the orchard and 25% of the sample is variety B, and the same proportion of the orchard and the sample is variety C.

    (b) This is stratified sampling. The strata are the variety regions, and the substrata are the smaller rectangular blocks that the variety regions are split up into.

38. The first sample had size $n_1 = 24,000$, the second sample had size $n_2 = 10,300$. The estimated N-value was $N = 1,100,000$. We can set up the proportion

$$\frac{k}{n_2} = \frac{n_1}{N} \to \frac{k}{10,300} = \frac{24,000}{1,100,000}, \text{ where } k \text{ is the number of recaptured carp that were tagged.}$$

    By cross-multiplying, we get $k = 224.7$. Since we need to have a whole number answer, we can round up, and say that 225 carp that were recaptured had tags.

41. (a) The target population is anyone who has or might in the future have a cold - basically any adult.

    (b) The sampling frame, however, is college students in San Diego, and the sample is those students who are suffering from a cold. This clearly does not represent the target population.

(c) Yes, the sampling frame is much younger on average than the general adult populace, which could definitely affect the duration of a cold or the effectiveness of the vitamin.

42. (a) This was not a controlled study, since there was no control group, only a treatment group.

(b) The age of the subjects (much younger than the average adult), the geographical location (San Diego is more temperate than most other places in the country), how far along in their colds the subjects were at the start of the study.

43. There was no control group, the sample is biased in terms of age and geography, and the subjects themselves determined when their colds were over.

44. There are many possible answers to this.

67. (a) i. The sky
ii. The coffee in the cup
iii. The entire math class

(b) None of these samples were random. They could all be considered to be convenience samples.

(c) i. Al's conclusion could be valid or not, depending on the weather cycles in his geographical location. If he were in Tucson, this might not be valid, since (especially during monsoon season), since just because he sees no clouds outside his windown in the morning doesn't mean that it won't pour later, once the clounds move in. However, mostly if you look out the window and don't see clouds, it won't rain.

ii. Since the coffee on top is too hot, it is likely that the rest of the coffee in the cup is too hot as well, so Betty's conclusion that all the coffee in her cup is too hot for her to drink is valid.

iii. This is most likely invalid, since Carla's sample is just the students next to her. Possibly the students in her class who don't pay attention all sit in the same part of class, so it makes sense that there would be three C grades in a row near Carla.

72. There are no right or wrong answers to this, just good analysis.