STAT22000 Summer 2020 Homework 4

Reading: Section 1.1, 1.3, 1.4, 1.5

Problems for Self-Study : (Do Not Turn In)

- Exercise 1.11, 1.13, 1.15, 1.21, 1.23, 1.25, 1.27, 1.29, 1.37 on p.58-64. The answers can be found at the end of the book (p.405-407).

- Self-study problems are as important as Turn-In problems. We don't require submission because we think you can learn from those problems by doing them yourself and checking the answers, without grading feedbacks. If having questions about those problems, you are welcome to ask the instructor or the TA.

Problems to Turn In: due midnight of **Friday, July 3, on Canvas**.

1. The table shows results of whether the death penalty was imposed in murder trials in Florida between 1976 and 1987. For instance, the death penalty was given in 53 out of 467 cases in which a white defendant had a white victim[1].

Defendant's Race	Victim's Race	Death Penalty Yes	Death Penalty No	Total
White	White	53	414	467
	Black	0	16	16
Black	White	11	37	48
	Black	4	139	143

   (a) First, consider only the cases with white victims. What proportion of the white defendants received the death penalty? What proportion of the black defendants received the death penalty? Was a white or a black defendant more likely to receive death penalty when the victim was white?

   (b) Repeat part (a) for cases with black victims. Was a white or a black defendant more likely to receive death penalty when the victim was black?

   (c) Now add up the two tables together to get a summary contingency table that describes the association between the death penalty verdict and defendant's race, ignoring the information about the victim's race. What proportion of white defendants received the death penalty? What proportion of black defendants received the death penalty? Which proportion is higher?

   (d) How can you explain the association in part (c), whereby white defendants were more like to receive death penalty? How can this association be so different from the ones you found in part (a) and (b)? *Hint: Your explanation must address the following.*

        i. *When the defendant was white, was the victim more likely to be black or white?*

        ii. *When the defendant was black, was the victim more likely to be black or white?*

        iii. *Was the death penalty more likely to be given when the victim was white or black, or no apparent difference?*

        Use the three observations above to explain how the association in (c) is so different from in the one in part (a) and (b).

2. In each of the following situations, identify the sampling method as one of the following: simple random sampling, stratified sampling, multistage sampling, or voluntary response sampling.

   (a) There are seven sections of an introductory statistics course. A random sample of three sections is chosen and then random samples of 8 students from each of these sections are chosen.

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[1]Source: Originally published in *Florida Law Review*. Michael Radelet and Glenn L. Pierce, Choosing Those Who Will Die: Race and the Death Penalty in Florida, vol. 43, *Florida Law Review* 1 (1991).

(b) An online poll asks people who visit this site to choose their favorite television show.

(c) Separate random samples of male and female first-year college students in an introductory psychology are selected to receive a one-week alternate instructional method.

3. A survey is carried out by the finance department to determine the distribution of household size in a certain city. They draw a simple random sample of 1,000 households. After several visits, the interviewers find people at home in only 653 of the sample households. Rather than face such a low response rate, the department draws a second batch of households, and uses the first 347 completed interviews in the second batch to bring the sample up to its planned strength of 1,000 households. The department counts 3,087 people in these 1,000 households, and estimates the average household size in the city to be about 3.1 persons. Is this estimate likely to be too low, too high, or about right? Why?

4. Suppose you are on the staff of a member of Congress who is considering a bill that would provide government-sponsored insurance for nursing-home care. You report that 1128 letters have been received on the issue, of which 871 oppose the legislation. "I'm surprised that most of my constituents oppose the bill. I thought it would be quite popular," says the congresswoman. Are you convinced that a majority of the voters oppose the bill? How would you explain the statistical issue to the congresswoman?

5. Carol Dweck is a noted psychologist from Stanford who believes that we should praise students' effort and not their intelligence. In her seminal study (2006), she gave students a test and then randomly divided the students into two groups. She praised the effort of one group and praised the intelligence of the other group. For their next exercise, the groups were given a choice of a challenging task or an easy task. Of those who were praised for their effort, 90% chose the challenging task, whereas fewer than half of the students who were praised for their intelligence chose the challenging task, fearful of losing their smart status.

(a) What are the treatments in this study? What is the response variable?

(b) Can we conclude from the study that praising the effort rather than the intelligence prompted the students chose the challenging task?

(c) Were the subjects of study randomly sampled from some population at large? Can the results of the study be generalized to the population at large?