

Solutions of homework 7

5.30 Note that $\bar{y} = 46.6 + 0.41$. We predict that Octavio will score 4.1 points above the mean on the final exam: $\hat{y} = 46.6 + 0.41(\bar{x} + 10) = 46.6 + 0.41\bar{x} + 1.4$. (Alternatively, because the slope is 0.41, we can observe that an increase of 10 points on the midterm yields an increase of 4.1 on the predicted final exam score.)

5.32 In this case, there may be a causative effect, but in the direction opposite to the one suggested: People who are overweight are more likely to be on diets, and so choose artificial sweeteners over sugar. (Also, heavier people are at a high risk to develop diabetes; if they do, they are likely to switch to artificial sweeteners.)

5.34 The explanatory variable is whether or not a student has taken at least two years of a foreign language, and the score on the test is the response. The lurking variable is the students' English skill *before* taking (of not taking) the foreign language: Students who have a good command of English early in their high school careers are more likely to choose (or be advised to choose) to take a foreign language.

7.4 Adult residents of the U.S. (Exact descriptions of the population may vary.)

7.5 All U.S. Households. (Exact descriptions of the population may vary.)

7.6 All voltage regulators in the last shipment. (Exact descriptions of the population may vary.)

7.14 The second question produced the lower response in favor of a tax cut. "New government programs" is vague and would not be very appealing, while the specific programs mentioned in the second question include something to appeal to just about everyone.

7.25 The population is (adult) black residents of Miami. The sample is made up of one adult from each responding black household among the 300 selected addresses. The sample will underestimate black dissatisfaction with the police because of reluctance to make negative comments about the police to an officer.

Note: The sample size is not clear in this situation, because some households may not include black, and some may decline to participate. We can only say that there will be no more than 300 people in the sample. Also, do not confuse bias in surveys with racial bias.

7.26 Numbering from 01 to 32 alphabetically (down the columns), we enter Table B at line 117 and choose

16 (Husain), 32 (Zhao), 18 (Kim), 06 (Calloway), 23 (Percival), 19 (Molina), 03 (Batista), 25 (Puri), 04 (Bell), 02 (Arroyo).

If we number from 00 to 31 instead, the numbers are the same, but the names would be different.

7.33 (a) False. Such Regularity holds only in the long run. If we were true, you could look at the first 39 digits and know whether or not the 40th 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 1/10000 to be 0000, so this sequence will occasionally occur. 0000 is no more or less random than 1234 or 3141, or any other four digits sequence.

7.38 (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 am 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.

8.3 (a) The individuals are batches of the product; the response variable is the yield of a batch.

(b) There are two factors (temperature and stirring rate) and six treatments (temperature-stirring rate combinations). Diagram is omitted.

(c) Twelve batches are needed.

8.21 (a) Diagram is omitted.

(b) The most straightforward approach to the randomization is to first assign all the men and then assign the women: Label men 01, ... 12, and use Table B to choose two men (12, 04) for the treatment 1, then two more (02, 08) for the treatment 2, etc. When all men are assigned, label the women 01, ... 24 and assign four (16,19,22,05) to the treatment 1, and so on.

8.28 The subjects are the 300 sickle cell patients. The factor is the drug given; the treatments are hydroxyurea and placebo. The response variable is the number of pain episodes.

8.32 (a) Outline is omitted.

(b) Have each subject do the task twice, once under each temperature condition, randomly choosing which temperature comes first. Compute the difference in each subject's performances at the two temperatures.