

2019Spring-ST305-HW3-Solution

(Total points: 32)

Ch 3.1: 17, 18, 25, 27, 30, 39

Ch 3.2: 52, 53, 55, 73, 75

Ch 3.3: 86, 87, 88

3.17 (3 points: 1 for each)

- (a) Shopping patterns may differ on Friday and Saturday.
- (b) Responses may vary in different states.
- (c) A control is needed for comparison.

3.18 (3 points: 1 for each)

- (a) Assigning subjects by gender is not random. It should be better to treat gender as a blocking variable, assigning five men and five women to each treatment.
- (b) This randomization will not necessarily divide the subjects into two groups of five. (Note that it would be a valid randomization to use this method until one group had four subjects, and then assign any remaining subjects to the other group.)
- (c) The 10 rats in a batch might be similar to one another in some way. For example, they might be siblings, or they might have been exposed to unusual conditions during shipping. (The safety approach in this situation would be to treat each batch as a block, and randomly assign two or three rats from each batch to each treatment.)

3.25 (3 points: 1 for each)

- (a) For example, flip a coin for each customer to choose which variety he/she will taste.
- (b) For example, flip a coin for each customer to choose which variety he/she will taste first.
- (c) If each customer tastes both varieties, we only need to ask which was preferred.

3.27 (1 point)

Experimental unites: fine seedings

Factors: light

Treatment: planted in full light/planted in reduced light

Response variable: growth of pines

3.30 (3 points: 1 for each)

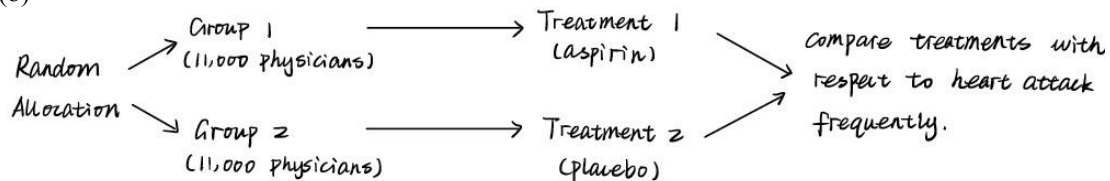
(a) Experimental subjects: 22000 male physicians

Factor: use of medication

Levels: aspirin, placebo

Response Variable: number of heart attacks

(b)



- (c) The difference in the number of heart attacks between the two groups was great enough to assume that it did not occur by chance.

3.39 (2 points: 1 for each)

- (a) The first design reveals that an experimental design. Because the population is divided into two groups of size 200, one for the treatment group and the other for the placebo group.
- (b) The design is simply known as an observational study. The second design will produce less trustworthy data since in the case intervention may prevent seeing the real picture.

3.52 (4 points: 1 for each)

- (a) This is a multistage sample: We first sample three of the seven course sections, then eight from each chosen section.
- (b) This is an SRS: Each student has the same chance ($5/55$) of being selected.
- (c) This is a voluntary response sample: Only those who visit the site can participate (if they choose to).
- (d) This is a stratified random sample: Males and females (the strata) are sampled separately.

3.53 (3 points: 1 for each)

- (a) This is a census rather than a sample.
- (b) Many people will probably not realize that dihydrogen monoxide is water.
- (c) In a public setting, few people will admit to cheating.

3.55 (1 point) Population for this sample survey is the local businesses in the college town. Sample is the 150 businesses chosen at random from telephone book listings.

$$\text{Rate of non-response} = \frac{150-73}{150} = 51.3\%.$$

3.73 (2 points: 1 for each)

- (a) Households without telephones or with unlisted numbers. Such household would likely be made up of poor individuals, those who choose not to have land lines, and those who do not wish to have their phone number published.
- (b) Those with unlisted numbers.

3.75 (1 point) First wording pulls responds towards a tax cut because it does not say anything about new government programs, whereas second wordings clearly states the new government programs where surplus money will be spent on programs for education, the environment, health care, crime-fighting and military defence.

3.86 (1 point)

No. With sufficiently large populations (“at least 100 times larger than the sample”), the variability (and margin of error) depends on the sample size.

3.87 (3 points: 1 for each)

- (a) Multistage.
- (b) Attitudes in smaller countries (many of which were not surveyed) might be different.
- (c) An individual country’s reported percent will typically differ from its true percent by no more than the stated margin of error.

3.88 (2 points: 1 for each)

- (a) Population of the sample is people of Canadian; sample is probability sample of 61,239 adults.
- (b) Yes, estimates are close to truth about the entire population because the sample size is large and large random samples almost always give an estimate that is close to the truth.