Written Homework 01

● Graded

Student

Fady Youssef

Total Points

14 / 15 pts

Question 1

Exercise 1

3 / 3 pts

✔ **– 0 pts** Correct

– 1 pt Does not adequately explain why study is observational

– 1.5 pts Incorrect type of study

– 1.5 pts Response does not identify type of study

– 2 pts Correct response but incorrect explanation

– 2 pts Valid reasoning but incorrect response

– 3 pts Incorrect response

– 3 pts Response does not answer question

Question 2

Exercise 2

2 / 2 pts

✔ **– 0 pts** Correct

– 0.5 pts Correct values but one item mislabeled

– 1 pt One value correct, the other incorrect or not provided

– 2 pts Values identified incorrectly

– 2 pts No values identified

Question 3

Exercise 3

9 / 10 pts

- **– 0 pts** Correct
- **– 0.5 pts** Some incorrect or limited reasoning in (a)
- **– 1 pt** Incorrect reason in part (a)
- **– 1.5 pts** Incorrect response in (a) but some good reasoning
- **– 2 pts** Incorrect response in (a)
- **– 2 pts** No response for (a)
- **– 0.5 pts** Slightly incorrect explanatory variable in (b)
- **– 0.5 pts** Slightly incorrect response variable in (b)
- **– 0.5 pts** Described how response variable is measured, but not the response variable itself in (b)
- **– 1 pt** Incorrect explanatory variable in (b)
- **– 1 pt** Incorrect response variable in (b)
- **– 1 pt** Answer not specific enough in (b)
- **– 2 pts** Both variables incorrect in (b)
- **– 0.5 pts** Some incorrect or limited reasoning in (c)
- **– 1 pt** Correct response in (c) but no explanation
- **– 2 pts** Incorrect response for (c)
- **– 2 pts** No response for (c).
- **– 0.5 pts** Didn't identify nurses as limit to double-blindness in (d)
- **– 1 pt** Correct response in (d) but invalid or limited reasoning.
- ✔ **– 1 pt** Incorrect response but good reasoning in (d)
- **– 1.5 pts** Incorrect response but some good reasoning in (d)
- **– 2 pts** No response for (d)
- **– 0.5 pts** Some incorrect or limited reasoning in (e)
- **– 1 pt** Not fully correct in part (e) but good reasoning
- **– 1 pt** Correct response in (e) but invalid or limited reasoning
- **– 1.5 pts** Incorrect response in (e) but some good reasoning
- **– 2 pts** No response for (e)

You're absolutely right that the nurses knowing the treatment limits the double-blindness, but the study is still considered double-blind because the patients and researchers are both blind.

No questions assigned to the following page.

Math 321 Spring 2025: Written Homework 1
Name: Fady Youssef

Complete the following exercises.
1. Below is an excerpt from an article published in the NY Times titled “Risks: Smokers Found More Prone to Dementia.”

“Researchers analyzed data from 23,123 health plan members who participated in a voluntary exam and health behavior survey from 1978 to 1985, when they were 50-60 years old. 23 years later, about 25% of the group had dementia, including 1,136 with Alzheimer’s disease and 416 with vascular dementia. After adjusting for other factors, the researchers concluded that pack-a-day smokers were 37% more likely than nonsmokers to develop dementia, and the risks went up with increased smoking; 44% for one to two packs a day; and twice the risk for more than two packs.”

Based on this study, can we conclude that smoking causes dementia later in life? Explain your reasoning.

While the study indicated a strong link between smoking and a higher risk of dementia, it still doesn’t necessarily prove smoking is linked to dementia. Smokers, and especially the heavy smokers were more likely to develop dementia but we can’t confirm smoking is the cause of dementia because this is an observational study, not accounting for outside factors like genetics or habits. Researchers would need to take the time to set up a proper controlled experimental design to better understand the implications within the link of smoking and dementia.

2. A recent article in a college newspaper stated that college students get an average of 5.5 hours of sleep each night. A student who was skeptical about this value decided to conduct a survey by randomly sampling 25 students. On average, the sampled students slept 6.25 hours per night.

Identify which value represents the sample mean $\bar{x}$ and which value represents the claimed population mean μ.

- the sample mean $\bar{x}$ represents the average sleep duration from the randomly sampled 25 students which was 6.25 hours per night.
- the claimed population mean μ represents the average sleep duration for all college students which was 5.5 hours each night.

3. To assess the effectiveness of taking large doses of vitamin C in reducing the duration of the common cold, researchers recruited 400 healthy volunteers from staff and students at a university. A quarter of the patients were assigned a placebo, and the rest were evenly divided between 1g Vitamin C, 3g Vitamin C, or 3g Vitamin C plus additives to be taken at onset of a cold for the following two days. All tablets had identical appearance and packaging. The nurses who handed the prescribed pills to the patients knew which patient received which treatment, but the researchers assessing the patients when they were sick did not. No significant differences were observed in any measure of cold duration or severity between the four groups, and the placebo group had the shortest duration of symptoms.

(a) Was this an experiment or an observational study? Why?

Experimental because there were controlled groups and treatments given to participants.

No questions assigned to the following page.

(b) What are the explanatory and response variables in this study?Explanatory variable: the type of treatment (placebo, 1g Vitamin C, …)
Response variable: duration and severity of cold symptoms

(c) Were the patients blinded to their treatment? Why?
Yes, since the tablets were identical, the patients didn't know which treatment was taken.

(d) Was this study double-blind? Why?
No, since the nurses knew which pills were being handed to the patients, it was not double-blind.

(e) Participants are ultimately able to choose whether or not to use the pills prescribed to them. We might expect that not all of them will adhere and take their pills. Does this introduce a confounding variable to the study? Explain your reasoning

Yes, non-adherence is a confounding variable because if some participants didn't take their pills, it could skew the results and make it harder to see the true effect of the treatment.