

Name: _____

Class: _____

Class #: _____

Section #: _____

Instructor: Nathaniel Stevens

Assignment: Quiz 1

Question 1: (1 point)

QPDAC is a framework for planning and executing an experiment. This acronym stands for:

- (a) Query, Problem, Design, Analyze, Conclusion
 - (b) Question, Plan, Design, Analysis, Conclusion
 - ☒ (c) Question, Plan, Data, Analysis, Conclusion
 - (d) Quirrell, Potter, Dobby, Albus, Cedric
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Question 2: (1 point)

Relative to a controlled experiment, the disadvantage of an observational study is that it may be risky and unethical.

True

☐

False

☒

Question 3: (1 point)

Randomization is meant to eliminate the effect of which type of factor?

- (a) X-factor
- (b) Nuisance factor
- (c) Design factor
- ☒ (d) Allowed-to-vary factor

Question 4: (1 point)

Blocking is meant to eliminate the effect of which type of factor?

- (a) X-factor
- (b) Allowed-to-vary factor
- (c) Design factor
- ☒ (d) Nuisance factor

Question 5: (1 point)

Nathaniel has taught STAT 430/830 in Spring 2019 and in Spring 2020. In 2019 instruction was in-person and in 2020 instruction was online. He is interested in determining which teaching method (in-person or online) results in better student performance. To determine this, it would have been ideal to observe the 2019 student performance with in-person AND online instruction, or the 2020 student performance with in-person AND online instruction. Instead, he can only observe the 2019 student performance with in-person instruction and the 2020 student performance with online instruction. In this context, which of the following represents a *counterfactual*?

- (a) 2019 student performance with online instruction
- (b) 2020 student performance with in-person instruction
- ☒ (c) Both of the above
- (d) None of the above

Question 6: (1 point)

Suppose you run an experiment with two conditions and you find that one condition has a disproportionately large number of teenagers. This causes you to wonder if your randomization procedure is faulty. Which of the following tests would be most helpful for diagnosing this problem?

- (a) Sample Ratio Mismatch Test
- ☒ (b) A/A Test
- (c) Both of the above

Question 7: (12 points)

YouTube is experimenting with two versions of its recommendation algorithm. Two thousand users were randomly selected and then randomly assigned one of the two versions of the algorithm for their session (i.e., 1000 users in each condition). Interest lies in determining whether or not the users choose to watch one of the recommended videos. The data scientists running the experiment are worried about a day-of-week effect and so the experiment is run only on a Wednesday. Ultimately the algorithm that achieves a higher recommendation acceptance rate will be put into full production.

In the sentences below, select from the dropdown menus the word that most appropriately fills in the blank. Note that there is exactly one correct answer for each blank space.

(a) The Youtube experiment has two experimental conditions. These conditions are defined by the design factor *algorithm version*, which has two levels.

(b) The number 1000 in each condition is called the sample size and this corresponds to the experimental design principle called replication.

(c) Each of the users is considered an experimental unit.

(d) The manner in which the users were selected for inclusion in the experiment is an example of the experimental design principle called randomization.

(e) 'Day of week' in this experiment can be thought of as a nuisance factor and the manner in which this is dealt which is an example of blocking.

(f) The response variable, which indicates whether a user watches a recommended video, is binary.

(g) The *recommendation acceptance rate* is the metric of interest

(h) The benefit of such an experiment, relative to an observational study, is that it facilitates causal inference.