AP Statistics
Test 3
Show all work and justify your answers
Each question is worth 3 points

1.

A school principal wanted to investigate student opinion about the food served in the school cafeteria. The principal selected at random samples of 50 first-year students, 50 second-year students, 50 third-year students, and 50 fourth-year students to complete a questionnaire. Which of the following best describes the principal's sampling plan?

(A) A stratified random sample
(B) A simple random sample
(C) A cluster sample
(D) A convenience sample
(E) A systematic sample

2.

An experiment will be conducted to determine whether children learn their multiplication facts better by practicing with flash cards or by practicing on a computer. Children who volunteer for the experiment will be randomly assigned to one of the two treatments. Because the children's gender may affect the outcome, there will be blocking by gender. After practice, the children will be given a test on their multiplication facts. Why will it be impossible to conduct a double-blind experiment?

(A) The experimenter will know whether the child is a boy or a girl and whether he or she used flash cards or the computer.
(B) The child will know whether he or she is a boy or a girl.
(C) The child will know whether he or she used flash cards or the computer.
(D) The person who grades the tests will know whether the child was a boy or a girl.
(E) The person who grades the tests will know whether the child used flash cards or the computer.

Free Response
Show your work and justify your answers
14 points

Because of concerns about employee stress, a large company is conducting a study to compare two programs (tai chi or yoga) that may help employees reduce their stress levels. Tai chi is a 1,200-year-old practice, originating in China, that consists of slow, fluid movements. Yoga is a practice, originating in India, that consists of breathing exercises and movements designed to stretch and relax muscles. The company has assembled a group of volunteer employees to participate in the study during the first half of their lunch hour each day for a 10-week period. Each volunteer will be assigned at random to one of the two programs. Volunteers will have their stress levels measured just before beginning the program and 10 weeks later at the completion of it.

(a) A group of volunteers who work together ask to be assigned to the same program so that they can participate in that program together. Give an example of a problem that might arise if this is permitted. Explain to this volunteer group why random assignment to the two programs will address this problem.

(b) Someone proposes that a control group be included in the design as well. The stress level would be measured for each volunteer assigned to the control group at the start of the study and again 10 weeks later. What additional information, if any, would this provide about the effectiveness of the two programs?

(c) Is it reasonable to generalize the findings of this study to all employees of this company? Explain.

(d) Prior to conducting the experiment, you learned that some employees work on the night shift and some employees work on the day shift. How could you incorporate blocking to improve this experiment? Explain.

(e) Could double blinding be applied to this experiment? Explain.

AP Statistics
Test 3
Show all work and justify your answers
Each question is worth 3 points

1.

Which of the following distinguishes an observational study from a randomized experiment?

(A) In an observational study volunteers are always used, whereas in a randomized experiment a random sample is always taken from the population.

(B) In an observational study a random sample is always taken from the population, whereas in a randomized experiment volunteers are always used.

(C) In an observational study treatments are not randomly assigned, whereas in a randomized experiment treatments are randomly assigned.

(D) In an observational study a control group is never used, whereas in a randomized experiment a control group is always used.

(E) An observational study can be double-blind, whereas a randomized experiment can only be single-blind because the experimenter determines who is randomly assigned to each treatment.

2.

A school principal wanted to investigate student opinion about the food served in the school cafeteria. The principal selected at random samples of 50 first-year students, 50 second-year students, 50 third-year students, and 50 fourth-year students to complete a questionnaire. Which of the following best describes the principal's sampling plan?

(A) A stratified random sample
(B) A simple random sample
(C) A cluster sample
(D) A convenience sample
(E) A systematic sample

Free Response

Show your work and justify your answers

Before beginning a unit on frog anatomy, a seventh-grade biology teacher gives each of the 24 students in the class a pretest to assess their knowledge of frog anatomy. The teacher wants to compare the effectiveness of an instructional program in which students physically dissect frogs with the effectiveness of a different program in which students use computer software that only simulates the dissection of a frog. After completing one of the two programs, students will be given a posttest to assess their knowledge of frog anatomy. The teacher will then analyze the changes in the test scores (score on posttest minus score on pretest).

(a) What are the explanatory variable and the response variable?

(b)

Describe a method for assigning the 24 students to two groups of equal size that allows for a statistically valid comparison of the two instructional programs.

(c)

Suppose the teacher decided to allow the students in the class to select which instructional program on frog anatomy (physical dissection or computer simulation) they prefer to take, and 11 students choose actual dissection and 13 students choose computer simulation. How might that self-selection process jeopardize a statistically valid comparison of the changes in the test scores (score on posttest minus score on pretest) for the two instructional programs? Provide a specific example to support your answer.

(d) What if the teacher did the experiment with 10 sixth graders and 14 seventh graders? How would incorporate blocking to improve this experiment?

(e) Would it make sense to use double blinding in this experiment? Explain.

Test 3
Show all work and justify your answers
Each question is worth 3 points

1.

An experiment will be conducted to determine whether children learn their multiplication facts better by practicing with flash cards or by practicing on a computer. Children who volunteer for the experiment will be randomly assigned to one of the two treatments. Because the children's gender may affect the outcome, there will be blocking by gender. After practice, the children will be given a test on their multiplication facts. Why will it be impossible to conduct a double-blind experiment?

(A) The experimenter will know whether the child is a boy or a girl and whether he or she used flash cards or the computer.
(B) The child will know whether he or she is a boy or a girl.
(C) The child will know whether he or she used flash cards or the computer.
(D) The person who grades the tests will know whether the child was a boy or a girl.
(E) The person who grades the tests will know whether the child used flash cards or the computer.

2.

A school principal wanted to investigate student opinion about the food served in the school cafeteria. The principal selected at random samples of 50 first-year students, 50 second-year students, 50 third-year students, and 50 fourth-year students to complete a questionnaire. Which of the following best describes the principal's sampling plan?

(A) A stratified random sample
(B) A simple random sample
(C) A cluster sample
(D) A convenience sample
(E) A systematic sample

Free Response

Show your work and justify your answers

Before beginning a unit on frog anatomy, a seventh-grade biology teacher gives each of the 24 students in the class a pretest to assess their knowledge of frog anatomy. The teacher wants to compare the effectiveness of an instructional program in which students physically dissect frogs with the effectiveness of a different program in which students use computer software that only simulates the dissection of a frog. After completing one of the two programs, students will be given a posttest to assess their knowledge of frog anatomy. The teacher will then analyze the changes in the test scores (score on posttest minus score on pretest).

(a) What are the explanatory variable and the response variable?

(b)

Describe a method for assigning the 24 students to two groups of equal size that allows for a statistically valid comparison of the two instructional programs.

(c)

Suppose the teacher decided to allow the students in the class to select which instructional program on frog anatomy (physical dissection or computer simulation) they prefer to take, and 11 students choose actual dissection and 13 students choose computer simulation. How might that self-selection process jeopardize a statistically valid comparison of the changes in the test scores (score on posttest minus score on pretest) for the two instructional programs? Provide a specific example to support your answer.

(d) What if the teacher did the experiment with 10 sixth graders and 14 seventh graders? How would incorporate blocking to improve this experiment?

(e) Would it make sense to use double blinding in this experiment? Explain.

AP Statistics
Test 3
Show all work and justify your answers
Each question is worth 3 points

1.

A school principal wanted to investigate student opinion about the food served in the school cafeteria. The principal selected at random samples of 50 first-year students, 50 second-year students, 50 third-year students, and 50 fourth-year students to complete a questionnaire. Which of the following best describes the principal's sampling plan?

(A) A stratified random sample
(B) A simple random sample
(C) A cluster sample
(D) A convenience sample
(E) A systematic sample

2.

Which of the following distinguishes an observational study from a randomized experiment?

(A) In an observational study volunteers are always used, whereas in a randomized experiment a random sample is always taken from the population.

(B) In an observational study a random sample is always taken from the population, whereas in a randomized experiment volunteers are always used.

(C) In an observational study treatments are not randomly assigned, whereas in a randomized experiment treatments are randomly assigned.

(D) In an observational study a control group is never used, whereas in a randomized experiment a control group is always used.

(E) An observational study can be double-blind, whereas a randomized experiment can only be single-blind because the experimenter determines who is randomly assigned to each treatment.

Free Response
Show all work and justify your answers
14 points

Because of concerns about employee stress, a large company is conducting a study to compare two programs (tai chi or yoga) that may help employees reduce their stress levels. Tai chi is a 1,200-year-old practice, originating in China, that consists of slow, fluid movements. Yoga is a practice, originating in India, that consists of breathing exercises and movements designed to stretch and relax muscles. The company has assembled a group of volunteer employees to participate in the study during the first half of their lunch hour each day for a 10-week period. Each volunteer will be assigned at random to one of the two programs. Volunteers will have their stress levels measured just before beginning the program and 10 weeks later at the completion of it.

(a) A group of volunteers who work together ask to be assigned to the same program so that they can participate in that program together. Give an example of a problem that might arise if this is permitted. Explain to this volunteer group why random assignment to the two programs will address this problem.

(b) Someone proposes that a control group be included in the design as well. The stress level would be measured for each volunteer assigned to the control group at the start of the study and again 10 weeks later. What additional information, if any, would this provide about the effectiveness of the two programs?

(c) Is it reasonable to generalize the findings of this study to all employees of this company? Explain.

(d) Prior to conducting the experiment, you learned that some employees work on the night shift and some employees work on the day shift. How could you incorporate blocking to improve this experiment? Explain.

(e) Could double blinding be applied to this experiment? Explain.