MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Administrators of the fire department are concerned about the possibility of implementing a new property tax to raise moneys needed to replace old equipment. They decide to check on public opinion by having a random sample of the city’s population. Provide an appropriate response.

1) Each property owner has a 5-digit ID number. Use a random number table to choose forty numbers. Identify this sampling strategy.
   - A) stratified
   - B) cluster
   - C) systematic
   - D) convenience
   - E) simple

2) At the start of each week, survey every tenth person who arrives at the city park. Identify this sampling strategy.
   - A) systematic
   - B) simple
   - C) stratified
   - D) convenience
   - E) cluster

3) Randomly select a housing classification (say, apartments) and survey all the people who live in that property classification. Identify this sampling strategy.
   - A) simple
   - B) stratified
   - C) cluster
   - D) convenience
   - E) systematic

4) Have each firefighter survey 10 of his/her neighbors. Identify this sampling strategy.
   - A) systematic
   - B) stratified
   - C) convenience
   - D) simple
   - E) cluster

5) A magazine publisher always mails out a questionnaire two months before a subscription ends. This questionnaire asks its subscribers if they are going to renew their subscriptions. On average, only 9% of the subscribers respond to the questionnaire. Of the 9% who do respond, an average of 45% say that they will renew their subscription. This 9% who respond to the questionnaire are known as what?
   - A) The sampling frame
   - B) The sample
   - C) The population parameter of interest
   - D) The population
   - E) The bias
6) A computer network manager wants to test the reliability of some new and expensive fiber-optic Ethernet cables that the computer department just received. The computer department received 9 boxes containing 40 cables each. The manager does not have the time to test every cable in each box. The manager will choose one box at random and test 8 cables chosen randomly within that box. What is the population parameter of interest?

A) The 9 boxes
B) The one box that was chosen at random from the 9 boxes
C) The 8 cables chosen for testing
D) The percentage of working cables
E) 360 cables

7) George, a network engineer, ordered 400 CAT 5e Ethernet cables for use at his company’s network. After receiving these cables, he decided to randomly test 120 of these cables before using them. He was alarmed to find out that 89% of these cables failed completely. He returned the entire lot to the manufacturer. When he tested the cables, what was George’s sample? Round to the nearest whole number.

A) 400 cables
B) 356 cables
C) 107 cables
D) 120 cables
E) 280 cables

8) A mega-discount chain store just opened a new clothing store in town emphasizing mainly women’s clothing. Before opening, management had to decide whether to only carry either men’s, women’s, boys’, girls’, or infants’ clothing. After performing representative sampling of potential customers from each of these groups, it was decided to carry only women’s clothing. Identify the type of sampling used in this example.

A) Stratified sampling
B) Cluster sampling
C) Convenience sampling
D) Systematic sampling
E) Multistage sampling

9) One day a popular morning show on a local radio station conducted a phone-in survey regarding the recent rise in the city’s various utility rates. The survey lasted the entire morning show. Other than time constraints of the show, no callers were knowingly refused to voice their opinion on-air. The transcribed results were sent to various governmental agencies and local politicians. Identify the type of sampling used.

A) Systematic sampling
B) Cluster sampling
C) Voluntary response sampling
D) Convenience sampling
E) Attempted census
10) Each person in a simple random sample of 2,000 received a survey, and 317 people returned their survey. How could nonresponse cause the results of the survey to be biased?
   A) Those who did not respond caused a violation of the assumption of independence.
   B) Those who did not respond reduced the sample size, and small samples have more bias than large samples.
   C) Those who did respond may differ in some important way from those who did not respond.
   D) Those who did not respond represent a stratum, changing the simple random sample into a stratified random sample.
   E) Those who did not respond were indistinguishable from those who did not receive the survey.

11) Under which of the following conditions is it preferable to use stratified random sampling rather than simple random sampling?
   A) The population can be divided into a small number of strata so that each stratum contains a large number of individuals.
   B) The population can be divided into strata of equal sizes so that each individual in the population still has the same chance of being selected.
   C) The population can be divided into strata so that the individuals in each stratum are as much alike as possible.
   D) The population can be divided into large number of strata so that each stratum contains only a few individuals.
   E) The population can be divided into strata so that the individuals in each stratum are as different as possible.

12) The human resources department of a large, well-known telecommunications firm is behind schedule in writing a report about the job satisfaction of the company's employees. In an effort to quickly sample some people, the HR manager orders his subordinates to give out paper surveys to anyone you see sitting at their desk. What sampling method best describes what this HR manager is doing?
   A) Convenience sampling
   B) Attempted census
   C) Stratified sampling
   D) Voluntary response sampling
   E) Cluster sampling

13) The human resources manager of a large, well-known telecommunications firm wants to improve manager/employee relationships throughout the company. This HR manager wants to have several focus groups, each filled with randomly selected managers and employees in proportion to the company's overall manager/employee ratio. What sampling method best describes what is wanted by the HR manager?
   A) Stratified sampling
   B) Attempted census
   C) Convenience sampling
   D) Voluntary response sampling
   E) Cluster sampling
14) The human resources manager of a large, well-known telecommunications firm is genuinely concerned about the well-being of the company's employees. This HR manager will put up a survey on a company website asking for suggestions in improving the health of employees working there. For this scenario, what sampling method is being used?
   A) Cluster sampling
   B) Voluntary response sampling
   C) Multistage sampling
   D) Attempted census
   E) Stratified sampling

15) This state's largest university is comprised of several different colleges, institutes, and schools of study. These colleges, institutes, and schools are spread out throughout the city and nearby suburbs. The president of the university is curious about the average cost for a full-time, undergraduate student to attend one semester. All relevant costs to the student will be counted, including tuition, room and board, transportation, books, and so on. Tuition varies greatly within this university, and there are significant population differences among the colleges, institutes, and schools. What would be the most appropriate sampling method to use in order to estimate an average cost of attending this university for one semester?
   A) Voluntary response sampling
   B) Attempted census
   C) Convenience sampling
   D) Stratified sampling
   E) Simple random sampling

**Determine whether the report describes a prospective observational study, a retrospective observational study, or an experiment.**

16) 400 patients suffering from chronic back pain were randomly assigned to one of two groups. Over a four-month period, the first group received acupuncture treatments and the second group received a placebo. Patients who received acupuncture treatments improved more than those who received the placebo.
   A) Experiment
   B) Retrospective observational study
   C) Prospective observational study

17) An examination of the medical records of 10,000 women showed that those who were short and fair skinned had a higher risk of osteoporosis.
   A) Experiment
   B) Prospective observational study
   C) Retrospective observational study

18) An education researcher was interested in examining the effect of the teaching method and the effect of the teacher on students' scores on a reading test. Suppose there are four different teachers (Juliana, Felix, Sonia, and Helen) and three different teaching methods (A, B, and C). Students were randomly assigned to a teaching method and teacher. Those who studied with Sonia using method B achieved the highest scores.
   A) Retrospective observational study
   B) Prospective observational study
   C) Experiment
An observational study is described. Identify the specified element.

19) An examination of the medical records of 10,000 women who died between 1990 and 2000 showed that those who had taken steroids had a higher risk of osteoperosis. Identify the subjects studied.
   A) Women who died between 1990 and 2000 and who had suffered from osteoperosis
   B) Women who died between 1990 and 2000 and who had taken steroids
   C) Women who had taken steroids
   D) Women who suffered from osteoperosis
   E) Women who died between 1990 and 2000

20) An examination of the medical records of 10,000 women who died between 1990 and 2000 showed that those who had taken steroids had a higher risk of osteoperosis. Identify the parameter of interest.
   A) Years of steroids use
   B) Cause of death
   C) Year of death
   D) Gender
   E) Risk of osteoperosis

A designed experiment is described. Identify the specified element.

21) An education researcher was interested in examining the effect of the teaching method and the teacher on the reading level of students with learning disabilities. 257 students with learning disabilities participated in an experiment. There are four different teachers (Juliana, Felix, Sonia, and Helen) and three different teaching methods (A, B, and C). Students are randomly assigned to a teaching method and a teacher. Those who studied with Sonia using method B achieved the highest scores on a reading test. Identify the subjects studied.
   A) Students who studied with Sonia using method B
   B) Students with learning disabilities
   C) Teaching method
   D) Teacher
   E) Score on reading test

22) An education researcher was interested in examining the effect of the teaching method and the effect of the particular teacher on students' scores on a reading test. In a study, there are four different teachers (Juliana, Felix, Sonia, and Helen) and three different teaching methods (A, B, and C). The number of students participating in the study is 258. Students are randomly assigned to a teaching method and teacher. Those who studied with Sonia using method B achieved the highest scores. Identify the response variable measured.
   A) Teaching method
   B) The education researcher
   C) Score on reading test
   D) Method A, method B, method C
   E) Teacher
23) An education researcher was interested in examining the effect of the teaching method and the effect of the particular teacher on students' scores on a reading test. In a study, there are four different teachers (Juliana, Felix, Sonia, and Helen) and three different teaching methods (A, B, and C). The number of students participating in the study is 258. Students are randomly assigned to a teaching method and teacher. After a four-month period, students take a reading test and are given a score out of 10. Identify the levels of the factor "teaching method".
   A) Teaching method and teacher  
   B) Score on reading test  
   C) 1, 2, 3, 4, 5, 6, 7, 8, 9, 10  
   D) Juliana, Felix, Sonia, and Helen  
   E) Method A, method B, method C

24) A researcher wants to examine the effect of fertilizer and the effect of sunlight on the yield of tomatoes. She bought 60 tomato plants at a local garden store. She randomly assigned 30 tomato plants to be planted on the sunny side of the hill and 30 to be planted on the shady side. Within each group of 30 plants, she randomly assigned plants to one of three groups. The first group is grown with no fertilizer, the second group with a small amount of fertilizer, and the third group with a large amount of fertilizer. All tomato plants are planted at the same time and are all treated alike (in terms of how much they are watered, weeded etc). Each plant is grown to maturity. The total weight of tomatoes obtained from each plant is recorded. The person evaluating the results does not know which tomatoes received fertilizer or which were grown on the sunny side. Within both groups (those grown on the sunny side and those grown on the shady side) tomatoes grown with a large amount of fertilizer yielded the most tomatoes. Determine the nature and scope of the conclusion the experiment can reach.
   A) Yield may be increased for tomatoes grown with a large amount of fertilizer.
   B) Yield may be increased for tomatoes grown on the sunny side with a large amount of fertilizer.
   C) Since the technician tending to the plants could have been biased, no conclusion can be reached.
   D) For tomatoes grown on the sunny side, yield may be increased for tomatoes grown with a large amount of fertilizer.
   E) Since the person evaluating the results could have been biased, no conclusion can be reached.

25) An education researcher was interested in examining the effect of the teaching method and the teacher on students' reading levels. 257 students participated in an experiment. There were two different teachers (Juliana and Felix) and three different teaching methods (A, B, and C). Students were randomly assigned to a teaching method and teacher. At the end of the semester the students took a reading test on which they received a score out of 4. Students who studied with Felix using method B achieved the highest scores. Identify the number of treatments and list them.
   A) 3; Method A, method B, method C  
   C) 6; Juliana and method A, Juliana and method B, Juliana and method C, Felix and method A, Felix and method B, Felix and method C  
   D) 2; Juliana, Felix  
   E) 4; Score 1, score 2, score 3, score 4
26) A researcher wants to examine the effect of fertilizer and the effect of sunlight on the yield of tomatoes. She bought 60 tomato plants at a local garden store. She randomly assigned 30 tomato plants to be planted on the sunny side of the hill and 30 to be planted on the shady side. The 30 plants which are planted on the shady side are randomly assigned to one of three groups. The first group are grown with no fertilizer, the second group with a small amount of fertilizer, and the third group with a large amount of fertilizer. The 30 plants which are planted on the sunny side are likewise randomly assigned to one of three groups. The first group are grown with no fertilizer, the second group with a small amount of fertilizer and the third group with a large amount of fertilizer. All tomato plants are planted at the same time and are all treated alike (in terms of how much they are watered, weeded etc). Each plant is grown to maturity. The total weight of tomatoes obtained from each plant is recorded. Identify the treatments.
   A) No fertilizer, small amount of fertilizer, large amount of fertilizer
   B) Sunny, shady
   C) Fertilizer, location
   D) Fertilizer, blocking variable – location
   E) No fertilizer and sunny, small amount of fertilizer and sunny, large amount of fertilizer and sunny, no fertilizer and shady, small amount of fertilizer and shady, large amount of fertilizer and shady

27) A researcher wants to investigate whether different forms of exercise can be used to help hyperactive children. A group of 90 children is divided into two groups according to age – those aged 9–12 and those aged 5–8. Within each age group the children are randomly assigned to one of three groups. The first group will just do their normal exercise. The second group will be given an additional exercise routine (moderate). The third group will be given an additional exercise routine (strenuous). At the end of a four month period parents will be asked to evaluate their children’s progress. Identify the factor(s) and any blocking variables and the number of levels for each.
   A) Factor: exercise (3 levels), Blocking variable: age (2 levels)
   B) Factor: exercise (3 levels), Factor: age (2 levels)
   C) Factor: Normal exercise, additional exercise (moderate), additional exercise (strenuous) (3 levels)
   D) Normal exercise and age 5–8, additional exercise (moderate) and age 5–8, additional exercise (strenuous) and age 5–8, normal exercise and age 9–12, additional exercise (moderate) and age 9–12, additional exercise (strenuous) and age 9–12 (6 levels)
   E) Blocking variable: exercise (3 levels), Factor: age (2 levels)

28) A researcher wants to investigate whether different forms of exercise can be used to help hyperactive children. A group of 90 children is divided into two groups according to age – those aged 9–12 and those aged 5–8. Within each age group the children are randomly assigned to one of three groups. The first group will just do their normal exercise. The second group will be given an additional exercise routine (moderate). The third group will be given an additional exercise routine (strenuous). At the end of a four month period parents will be asked to evaluate their children’s progress. Identify the treatments.
   A) Exercise, blocking variable – age
   B) Normal exercise and age 5–8, additional exercise (moderate) and age 5–8, additional exercise (strenuous) and age 5–8, normal exercise and age 9–12, additional exercise (moderate) and age 9–12, additional exercise (strenuous) and age 9–12
   C) Age 5–8, age 9–12
   D) Exercise, age
   E) Normal exercise, additional exercise (moderate), additional exercise (strenuous)
Describe the design of the experiment (completely randomized or blocked).

29) An education researcher was interested in examining the effect of the teaching method and the teacher on students’ reading levels. 257 students participated in an experiment. There were two different teachers (Juliana and Felix) and three different teaching methods (A, B, and C). Students were randomly assigned to a teaching method and teacher. At the end of the semester the students took a reading test on which they received a score out of 20. Students who studied with Felix using method B achieved the highest scores.

A) Blocked by teacher, blocked by teaching method  
B) Completely randomized over one factor (teaching method), blocked by teacher  
C) Completely randomized over one factor (teacher), blocked by teaching method  
D) Completely randomized over one factor (teaching method)  
E) Completely randomized over two factors (teaching method and teacher)

Determine whether the experiment is single-blind, double-blind, or neither.

30) An education researcher was interested in examining the effect of the teaching method and the teacher on students’ reading levels. 257 students participated in an experiment. There were two different teachers (Juliana and Felix) and three different teaching methods (A, B, and C). Students were randomly assigned to a teaching method and teacher. At the end of the semester the students took a reading test on which they received a score out of 20. Students who studied with Felix using method B achieved the highest scores. The person evaluating the results does not know which teacher or teaching method the students were assigned to.

A) Single-blind  
B) Double-blind  
C) Neither

31) Is the aspirin produced by World’s Best Pharmaceutical Company better than that of a competitor at relieving headaches? 200 headache sufferers are chosen at random. Migrane Testing Service administers the experiment and provides the results evaluation. Three levels are made: participants receive contents from Bottle A, Bottle B, or Bottle C. Other than the fact that one bottle contains placebo aspirin, no other information is given to the testing service regarding the bottles’ contents.

A) Single-blind  
B) Double-blind  
C) Neither
32) The Asian longhorned beetle kills trees by burrowing within the trunk and branches and disrupting the sap flow. This beetle favors hardwood trees, such as maple, elm, and ash. A new pesticide will be tested in a major metropolitan city. A statistician designs an experiment for 200 mature maple trees and randomly assigns half of the trees to receive this new pesticide, and the rest of the trees receive a control treatment.

Is there any obvious way to improve this experiment to evaluate the effectiveness of this new pesticide?
A) Yes, a placebo is missing.
B) Yes, blocking must be used.
C) Yes, stratifying must be used.
D) No, basic variations have been accounted for.
E) Yes, matching must be used.

33) A pharmaceutical company will be testing a new “one-dosage fits all” medication for treating depression. The pharmaceutical company has 100 willing test subjects that will undergo a 30-day, double-blind experiment. The experiment uses the following diagram as a guide for administering the medication at various doses, from 5% to 125%.

What is the most obvious factor missing from this proposed experiment?
A) A 100% dosage
B) A control group
C) Stratifying must be used.
D) Blocking must be used.
E) Nothing is missing. Basic variations have been accounted for.
Identify the flaw(s) in the experiment or study described.

34) At St. Luke’s hospital in 1998, 674 women were diagnosed with breast cancer. Five years later, 88% of the Caucasian women and 83% of the African American women were still alive. A researcher concludes that being Caucasian causes women with breast cancer an increased chance of surviving five years. Since there is no random assignment and there may have been lurking variables, this conclusion is not justified. Which of the following are possible lurking variables?

I: Income  
II: Neighborhood where patient lives  
III: Quality of health care  
IV: Diet  
V: Number of years surviving since diagnosis

A) II, IV  
B) I, II, III, IV, V  
C) I, II, III, IV  
D) I, III, IV  
E) I, IV

35) A medical researcher believes that supplements of glucosamine can help to reduce the pain of arthritis. She would like to test the supplement at two different dosage levels. She designs an experiment as follows to test her conjecture. She will obtain a group of volunteers who suffer from arthritis. Each patient’s condition will be evaluated by a doctor at the start of the experiment. Volunteers will be randomly assigned to one of two groups. Each day for the duration of the experiment, patients in group 1 will receive a low dose of glucosamine, patients in group 2 will receive a higher dose of glucosamine. After a suitable amount of time (two months, for example), the doctor will evaluate each patient’s progress. Based on the amount of inflammation and the patient’s report on the amount of pain, the doctor will give each patient a numerical score to represent their improvement. The amount of improvement for the two groups would then be compared. She will have the evaluating doctor and the technicians administering the supplements blinded to whether patients receive a low dose or high dose. Identify the most serious flaw in this experiment.

A) The experiment is not double blind, doctor evaluating the progress may be biased.  
B) There is no blocking.  
C) There is no placebo group to control for the placebo effect.  
D) There could be lurking variables.  
E) Volunteers should have been selected randomly.
36) A pharmaceutical company has developed a medication which they believe will help to reduce the pain of arthritis. They would like to test the medication at two different dosage levels. They design an experiment as follows to test the medication. They will obtain a group of volunteers who suffer from arthritis. A doctor from the pharmaceutical company will evaluate each patient’s condition at the start of the experiment. Volunteers will be randomly assigned to one of three groups. Each day for the duration of the experiment, patients in group 1 will receive a low dose of the medication, patients in group 2 will receive a higher dose of the medication, and patients in group 3 will receive a placebo. After a suitable amount of time (two months, for example), the same doctor will evaluate each patient’s progress. Based on the amount of inflammation and the patient's report on the amount of pain, the doctor will give each patient a numerical score to represent their improvement. The amount of improvement for the three groups will then be compared. The researchers will have the technicians administering the medication blinded to whether patients receive a low dose, a high dose, or a placebo. Identify the most serious flaw in this experiment.
   A) The volunteers should have been randomly selected.
   B) There is no blocking.
   C) The doctor should choose the best treatment for each patient, instead of allowing volunteers to be assigned at random to a treatment.
   D) The experiment is only single blind. The doctor evaluating the patients’ progress is not blind to which treatment patients received.
   E) There could be lurking variables.

37) A researcher would like to investigate whether people suffering from insomnia can be helped by taking yoga classes. She designs an experiment as follows. She will obtain a group of volunteers who are suffering from insomnia and who do not currently practice yoga. Each person's degree of insomnia at the start of the experiment will be evaluated. She will investigate whether yoga classes every day or three times per week are more effective. So the factor yoga will have 3 levels (no yoga, yoga three times a week, yoga every day). Each volunteer will choose which group they would like to be part of. At the end of a suitable time period, for example two months, each person’s degree of insomnia will again be evaluated. The improvement for the three groups will then be compared. The person evaluating the insomnia levels will be blinded to which group the patients were in. Identify the most serious flaw in this experiment.
   A) There was no blocking.
   B) There was no placebo group.
   C) Volunteers chose their treatment instead of being randomly assigned to one of the groups.
   D) The volunteers were not selected randomly.
   E) The person evaluating the insomnia levels could have been biased.

Provide an appropriate response.

38) Double-blindness in experiments is important so that
   I. The evaluators do not know which treatment group the participants are in.
   II. The participants do not know which treatment group they are in.
   III. No one knows which treatment any of the participants is getting.
   A) II only
   B) III only
   C) I, II, and III
   D) I and II
   E) I only
39) Which of the following is not required in an experimental design?
   A) blocking
   B) randomization
   C) replication
   D) control
   E) All are required in an experimental design.

40) A researcher wants to compare the effect of a new type of shampoo on hair condition. The researcher believes that men and women may react to the shampoo differently. Additionally, the researcher believes that the shampoo will react differently on hair that is dyed. The subjects are split into four groups: men who dye their hair; men who do not dye their hair; women who dye their hair; women who do not dye their hair. Subjects in each group are randomly assigned to the new shampoo and the old shampoo. This experiment...
   A) has three factors (shampoo type, gender, whether hair is dyed).
   B) is completely randomized.
   C) has one factor (shampoo type), blocked by gender and whether hair is dyed.
   D) has two factors (shampoo type and whether hair is dyed) blocked by gender.
   E) has two factors (gender and whether hair is dyed) blocked by shampoo type.

41) Does donating blood lower cholesterol levels? 50 volunteers have a cholesterol test, then donate blood, and then have another cholesterol test. Which aspect of experimental design is present?
   A) blinding
   B) a placebo
   C) a control group
   D) randomization
   E) none of these

42) Does regular exercise decrease the risk of cancer? A researcher finds 200 women over 50 who exercise regularly, pairs each with a woman who has a similar medical history but does not exercise, then follows the subjects for 10 years to see which group develops more cancer. This is a...
   A) matched experiment
   B) survey
   C) retrospective study
   D) randomized experiment
   E) prospective study

43) Which is important in designing a good experiment?
   I. Randomization in assigning subjects to treatments.
   II. Control of potentially confounding variables.
   III. Replication of the experiment on a sufficient number of subjects.
   A) II and III
   B) I, II, and III
   C) I and III
   D) I only
   E) I and II
SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

44) Label each statement below with "E" for Experiment or "S" for Observational Study
   a) Similar patients with high blood pressure are randomly given three different doses of
      a new drug and their blood pressure is observed.  A) The
   b) ACT test scores of school athletes and non-athletes are compared. C) The
   c) A survey examines if doctors with different specialties have different stress levels. D) The

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

45) Is the roll of a fair die random? Why or why not?
   A) No. A 3 or 4 is the most likely outcome.
   B) No. You can usually predict the outcome on one of six attempts.
   C) Yes. You cannot predict the outcome beforehand.
   D) No. There is always a bias in a person’s rolling technique.
   E) Yes. You can predict the outcome beforehand.

46) Criticize the following simulation: A student uses a random number from 5 to 13 to simulate the
    shoe sizes of a population of females.
    A) The simulation should model the real situation.
    B) The simulation will not model the real situation. The shoes size of a particular female is
       unpredictable and cannot be modeled.
    C) The simulation will not model the real situation. To accurately model the population, the
       simulation should also account for the foot width.
    D) The simulation will not model the real situation. It will predict too many small sizes and too
       many large sizes. Extremes in foot size are not all that common.
    E) The simulation will not model the real situation. Some females have foot sizes that fall
       outside of the range.

47) Criticize the following simulation: A student uses a random number from 1 to 13 to simulate the
    value of a card drawn at random from a standard deck of playing cards.
    A) The simulation will not model the real situation. The simulation should use random numbers
       from 1 to 12.
    B) The simulation will not model the real situation. In reality, there are less "face" cards than
       cards with numbers.
    C) The simulation should model the real situation.
    D) The simulation will not model the real situation. The simulation must also account for the
       card’s suit.
    E) The simulation might not model the real situation. The deck may not be shuffled, in which
       case the real situation may not be random.

48) Criticize the following simulation: A student simulates math test scores by choosing a random
    number between 0 and 100.
    A) The simulation will not model the real situation. It fails to account for the amount of time
       each student spent studying for the exam.
    B) The simulation probably will not model the real situation. Most students dislike math.
    C) The simulation cannot model the real situation. The test performance of an individual
       student is inherently unpredictable.
    D) The simulation probably will not model the real situation. For example, the simulation will
       predict just as many scores between 10 and 20 as between 70 and 80. In reality, the
       distribution of grades will not be so uniform.
    E) The simulation should model the real situation.
49) A statistics student properly simulated the number of students at her high school who have the flu. She then reported, “The number of students at this school with the flu is 40.” What’s wrong with this conclusion?

A) The conclusion is not valid because the outcomes in the simulation are not equally likely.
B) The conclusion should indicate the number of trials used in the simulation.
C) The conclusion is not valid because random numbers cannot be used to accurately model the outcome chances.
D) The conclusion should indicate that the simulation suggests that there are 40 students at the school who have the flu. Actual results might not match the simulated results exactly.
E) Nothing is wrong with this conclusion.

50) When drawing five cards randomly from a deck, which is more likely, a royal flush or a full house? A royal flush is the five highest cards of a single suit. A full house is three of one denomination and two of another. How could you simulate 5–card hands? Once you have picked one card, you cannot pick that same card again. Describe how you will simulate a component and its outcomes.

A) The component is picking a single card. An outcome is the suit of the card. You could use the digits 01–52 for the 52 different cards, ignoring 00 and 53–99, or you could use a single digit 1, 2, 3, or 4 for the suit and then 01–13 for the denomination (ignoring 1, 5–9 for suits, and 00, 14–99 for denominations).
B) The component is picking five cards. An outcome is the suit and denomination of the cards. You could use the digits 01–52 for the 52 different cards, ignoring 00 and 53–99, or you could use a single digit 1, 2, 3, or 4 for the suit and then 01–13 for the denomination (ignoring 1, 5–9 for suits, and 00, 14–99 for denominations).
C) The component is picking five cards. An outcome is the denomination of the cards. You could use the digits 01–52 for the 52 different cards, ignoring 00 and 53–99, or you could use a single digit 1, 2, 3, or 4 for the suit and then 01–13 for the denomination (ignoring 1, 5–9 for suits, and 00, 14–99 for denominations).
D) The component is picking a single card. An outcome is the denomination of the card. You could use the digits 01–52 for the 52 different cards, ignoring 00 and 53–99, or you could use a single digit 1, 2, 3, or 4 for the suit and then 01–13 for the denomination (ignoring 1, 5–9 for suits, and 00, 14–99 for denominations).
E) The component is picking a single card. An outcome is the suit and denomination of the card. You could use the digits 01–52 for the 52 different cards, ignoring 00 and 53–99, or you could use a single digit 1, 2, 3, or 4 for the suit and then 01–13 for the denomination (ignoring 1, 5–9 for suits, and 00, 14–99 for denominations).

51) When drawing five cards randomly from a deck, which is more likely, a royal flush or a full house? A royal flush is the five highest cards of a single suit. A full house is three of one denomination and two of another. How could you simulate 5–card hands? Once you have picked one card, you cannot pick that same card again. Describe how you will simulate a trial.

A) A trial is a single five–card hand. Use one set of random numbers, ignoring repeated cards.
B) A trial is a single five–card hand. Use five sets of random numbers, ignoring repeated cards.
C) A trial is a single five–card hand. Use five sets of random numbers.
D) A trial is a single card. Use random numbers, ignoring repeated cards.
E) A trial is five–card hands, dealt until the deck is completely dealt. Use five sets of random numbers, ignoring repeated cards.
52) When drawing five cards randomly from a deck, which is more likely, a royal flush or a full house? A royal flush is the five highest cards of a single suit. A full house is three of one denomination and two of another. How could you simulate 5-card hands? Once you have picked one card, you cannot pick that same card again. Describe the response variable.

A) The response variable is whether the hand had a royal flush.
B) The response variable is whether the hand had a royal flush or a full house.
C) The response variable is whether the hand had a royal flush, a full house, or neither.
D) The response variable is whether the hand had a neither a royal flush nor a full house.
E) The response variable is whether the hand had a full house.
Answer Key
Testname: CUMULATIVE REVIEW

1) E  
2) A  
3) C  
4) C  
5) B  
6) D  
7) D  
8) A  
9) C  
10) C  
11) C  
12) A  
13) E  
14) B  
15) D  
16) A  
17) C  
18) C  
19) E  
20) E  
21) B  
22) C  
23) E  
24) A  
25) C  
26) E  
27) A  
28) E  
29) E  
30) A  
31) B  
32) D  
33) B  
34) C  
35) C  
36) D  
37) C  
38) D  
39) A  
40) C  
41) E  
42) E  
43) B  
44) a) E; b) S; c) S  
45) C  
46) D  
47) C  
48) D  
49) D  
50) E
Answer Key
Testname: CUMULATIVE REVIEW

51) B
52) C