Name _____ Pd _____

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

Provide an appropriate response.

1. The January 2005 Gallup Youth Survey telephoned a random sample of 1,028 U.S. teens aged 13–17   1. _____
and asked these teens to name their favorite movie from 2004. *Napoleon Dynamite* had the highest
percentage with 8% of teens ranking it as their favorite movie. Which is true?
I.   The population of interest is U.S. teens aged 13–17.
II. 8% is a statistic and not the actual percentage of all U.S. teens who would rank this movie as
their favorite.
III. This sampling design should provide a reasonably accurate estimate of the actual percentage of
all U.S. teens who would rank this movie as their favorite.
   A. II only
   B. I and II
   C. I only
   D. III only
   E. I, II, and III

2. Suppose your local school district decides to randomly test high school students for attention deficit   2. _____
disorder (ADD). There are three high schools in the district, each with grades 9–12. The school
board pools all of the students together and randomly samples 250 students. Is this a simple
random sample?
   A. No, because we can't guarantee that there are students from each school in the sample.
   B. No, because we can't guarantee that there are students from each grade in the sample.
   C. Yes, because they could have chosen any 250 students from throughout the district.
   D. Yes, because the students were chosen at random.
   E. Yes, because each student is equally likely to be chosen.

3. A basketball player has a 70% free throw percentage. Which plan could be used to simulate the   3. _____
number of free throws she will make in her next five free throw attempts?
I.   Let 0,1 represent making the first shot, 2, 3 represent making the second shot,..., 8, 9 represent
making the fifth shot. Generate five random numbers 0–9, ignoring repeats.
II. Let 0, 1, 2 represent missing a shot and 3, 4,..., 9 represent making a shot. Generate five random
numbers 0–9 and count how many numbers are in 3–9.
III. Let 0, 1, 2 represent missing a shot and 3, 4,..., 9 represent making a shot. Generate five random
numbers 0–9 and count how many numbers are in 3–9, ignoring repeats.
   A. II only
   B. I, II, and III
   C. II and III
   D. I only
   E. III only

4. A chemistry professor who teaches a large lecture class surveys his students who attend his class about how he can make the class more interesting, hoping he can get more students to attend. This survey method suffers from

    A. voluntary response bias
    B. undercoverage
    C. response bias
    D. nonresponse bias
    E. None of the above

4. _____

5. 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 will not model the real situation. To accurately model the population, the simulation should also account for the foot width.
    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 should model the real situation.
    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.

5. _____

6. 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 random numbers cannot be used to accurately model the outcome chances.
    B. 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.
    C. The conclusion should indicate the number of trials used in the simulation.
    D. The conclusion is not valid because the outcomes in the simulation are not equally likely.
    E. Nothing is wrong with this conclusion.

6. _____

7. A tax referendum for property tax funding for a bond issue to build a new school is on the ballot in the next election. A member of the referendum committee is confident that the question will have about 52% of the votes cast in the school district. But, you're worried that only 1,000 voters will show up at the polls since this is an off–year election. How often will the referendum question lose? To find out, you set up a simulation. Describe the response variable.

    A. The response variable is the number of votes for referendum that are yes.
    B. The response variable is whether the referendum loses or not.
    C. The response variable is the number of votes for referendum that are no.
    D. The response variable is the yes or no vote of one random voter.
    E. The response variable is whether the referendum wins or not.

7. _____

Solve the problem.

8. For each time up at bat, a baseball player has a 70% chance of making an out, a 10% chance of getting walked, and a 20% chance of getting a hit. Estimate the probability that, out of 5 at-bats, the player gets at least one hit. Use 30 simulation runs.

    A. 100%
    B. About 20%
    C. About 30%
    D. About 90%
    E. About 70%

8. _____

Provide an appropriate response.

9. Five men and three women are waiting to be interviewed for jobs. If they are all selected in random order, find the probability that the first person interviewed will be a woman. Your simulation should use at least 10 runs.

    A. $\frac{1}{8}$ B. 1   C. 0   D. $\frac{5}{8}$ E. $\frac{3}{8}$

9. _____

Answer the question.

10. A magazine publisher mails a survey to every subscriber asking about the quality of its subscription service. Mailing a survey to every subscriber represents what?
    A. The sampling frame
    B. The sampling method
    C. The population parameter of interest
    D. The sample
    E. A census

10. _____

11. A magazine publisher mails a survey to every subscriber asking about the quality of its magazine. The publisher wants 100% of the subscribers to respond. This 100% response rate will represent what?
    A. A census
    B. A sampling method
    C. A sampling frame
    D. An involuntary sample
    E. A population parameter of interest

11. _____

12. A magazine publisher is informed that 72% of subscribers last year did not renew their subscriptions. This publisher wants to randomly survey 8% of these past subscribers asking the reason why they did not renew their subscriptions. All of last year's subscribers who did not renew their subscriptions are known collectively as what?
    A. The population parameter of interest
    B. The bias
    C. The population
    D. The sampling frame
    E. A census

12. _____

13. 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 population
    B. The sample
    C. The sampling frame
    D. The population parameter of interest
    E. The bias

13. _____

14. Mr. Smith works at a computer consultant company that provides technical information to computer departments of various manufacturing companies. Mr. Smith is alarmed at the number of spyware programs on the internet. Mr. Smith successfully samples every one of his clients only to ask (yes or no) if they have had any known problems with spyware infections on their computers or network. None of Mr. Smith's clients reported any spyware infections. With regards to Mr. Smith's contacting his clients, what is the census?

    A. The total number of spyware programs on the internet
    B. The total number of computers at all of Mr. Smith's clients
    C. The number of spyware infections outside the sampling frame
    D. All of Mr. Smith's clients
    E. Zero, there were no known infections

14. _____

Provide an appropriate response.

15. An education researcher randomly selects 38 schools from one school district and interviews all the teachers at each of the 38 schools. Identify the type of sampling used in this example.

    A. Cluster sampling
    B. Attempted census
    C. Voluntary response sampling
    D. Systematic sampling
    E. Stratified sampling

15. _____

16. At the local college a survey was being done on whether or not the students liked the cafeteria food. The survey was located in the college newspaper and was to be filled out and sent to the editing office. Identify the type of sampling used in this example.

    A. Stratified sampling
    B. Cluster sampling
    C. Attempted census
    D. Voluntary response sampling
    E. Systematic sampling

16. _____

Identify the bias.

17. A non–for–profit consumer agency wanted to investigate the economic and humanitarian contribution of this country's pharmaceutical companies by sampling large companies and businesses of all types. It was decided to sample the pharmaceutical companies first. After surveying the pharmaceutical companies, someone at the consumer agency wanted to distribute the data early. What, if any, will be the most noticeable bias in distributing the survey at this point in time?

    A. Undercoverage of the population
    B. Voluntary response bias
    C. Response bias
    D. Nonresponse bias
    E. There does not seem to be any bias.

17. _____

18. A popular soft drink company distributes written surveys with its product that a customer can fill out and mailed in or the survey can be filled out electronically on the internet. What, if any, will be the most noticeable bias?

    A. Response bias
    B. Voluntary response bias
    C. Nonresponse bias
    D. Undercoverage of the population
    E. There does not seem to be any bias.

18. _____

19. Management at a particular post office wants to know about the quality of its face–to–face service at its customer service windows. For one week, the post office will ask the customers directly. After a customer is helped, a different employee asks the customer a short question about his or her customer service experience. The customer's comments are then transcribed by a secretary. This survey runs smoothly and a lot of customer comments are collected. What, if any, is the most noticeable bias for this survey regarding customer service at this post office for that week?

19. _____

    A. Nonresponse bias
    B. Undercoverage of the population
    C. Response bias
    D. Voluntary response bias
    E. There does not seem to be any bias.

Answer the question.

20. The human resources department of a large, well–known telecommunications firm would like to know the job satisfaction of the employees working at its company, but the HR department is restricted by company policy to use only email to distribute and collect any type of employee questionnaire or survey. What sampling method is HR being forced to rely upon?

20. _____

    A. Voluntary response sampling
    B. Cluster sampling
    C. Convenience sampling
    D. Stratified sampling
    E. Attempted census

21. The human resources department of a large, well–known telecommunications firm is behind schedule in sampling the job satisfaction of the company's employees. In an effort to catch-up, the HR manager quickly goes down an alphabetical list of employees and e–mails a survey to every tenth employee. An neutral third party collects all surveys and ensures all of the selected employees respond to the survey. What sampling method best describes what the HR manager is doing?

21. _____

    A. Systematic sampling
    B. Cluster sampling
    C. Convenience sampling
    D. Stratified sampling
    E. Voluntary response sampling

22. Several watch–dog consumer groups have criticized the fast food industry for serving food with excessive fat content. One watch–dog announced that it will randomly select one fast food chain per week. The watch–dog will then decide, as a group, to purchase one item off the menu that has been advertised the most on television and in the newspapers. The watch–dog will then have that heavily–advertised, just–purchased item professionally sampled for fat content. Weekly results will be posted on the watch–dog's website. For this scenario, what best describes the watch–dog's sampling activities each week?

22. _____

    A. Cluster sampling
    B. Multistage sampling
    C. Attempted census
    D. Stratified sampling
    E. Systematic sampling

23. 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?

23. _____

    A. Convenience sampling
    B. Attempted census
    C. Simple random sampling
    D. Voluntary response sampling
    E. Stratified sampling

Adminstrators 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.

24. Each property owner has a 5–digit ID number. Use a random number table to choose forty numbers. Identify this sampling strategy.

24. _____

    A. systematic
    B. cluster
    C. convenience
    D. stratified
    E. simple (SRS)

25. At the start of each week, survey every tenth person who arrives at the city park. Identify this sampling strategy.

25. _____

    A. systematic
    B. convenience
    C. cluster
    D. stratified
    E. simple

26. Have each firefighter survey 10 of his/her neighbors. Identify this sampling strategy.

26. _____

    A. cluster
    B. stratified
    C. simple
    D. systematic
    E. convenience

A member of the City Council has proposed a resolution opposing construction of a new state prison there. The council members decide they want to assess public opinion before they vote on this resolution. Identify the method that is proposed to sample local residents to determine the level of public support for the resolution.

27. Randomly select several city blocks; interview all the adults living on each block.

27. _____

    A. judgment
    B. cluster
    C. stratified
    D. systematic
    E. simple (SRS)

Solve the problem.

28. For a particular miniature golf hole, the chance of getting a hole–in–one is only 18%. The chance of sinking any subsequent putt is 50%. Estimate the average number of putts for this hole. Use 30 runs in your simulation.

    A. About 1.5 putts
    B. About 4.0 putts
    C. About 3.5 putts
    D. About 4.5 putts
    E. About 2.5 putts

28. _____

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

29. An educational researcher used school records to determine that, in one school district, 84% of children living in two–parent homes graduated high school while 75% of children living in single–parent homes graduated high school.

    A. Prospective observational study
    B. Experiment
    C. Retrospective observational study

29. _____

30. 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. Retrospective observational study
    B. Experiment
    C. Prospective observational study

30. _____

An observational study is described. Identify the specified element.

31. Among a group of married women who were tracked for ten years, those who worked full time were more likely to divorce than those who did not work full time. Identify the subjects studied.

    A. Married women working full time or not
    B. Divorced women who work full time
    C. Women who work full time
    D. Divorced women
    E. Married women who work full time

31. _____

32. 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. Risk of osteoperosis
    B. Years of steroids use
    C. Cause of death
    D. Year of death
    E. Gender

32. _____

A designed experiment is described. Identify the specified element.

33. In a clinical trial, 780 participants suffering from high blood pressure were randomly assigned to one of three groups. Over a one–month period, the first group received a low dosage of an experimental drug, the second group received a high dosage of the drug, and the third group received a placebo. The diastolic blood pressure of each participant was measured at the beginning and at the end of the period and the change in blood pressure was recorded. The biggest decrease in blood pressure was for those who received the low dosage of the drug. Identify the response variable measured.

    33. _____

    A. The participants in the experiment
    B. The treatment received (placebo, low dosage, high dosage)
    C. The dosage of the drug
    D. The one–month period
    E. Change in diastolic blood pressure

34. 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 wth Felix using method B achieved the highest scores. Identify the number of treatments and list them.

    34. _____

    A. 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
    B. 24; Score 1, Juliana, method A, Score 1, Juliana, method B,   Score 1, Juliana, method C,
        Score 2, Juliana, method A,   Score 2, Juliana, method B, Score 2, Juliana, method C,
        Score 3, Juliana, method A,   Score 3, Juliana, method B, Score 3, Juliana, method C,
        Score 4, Juliana, method A,   Score 4, Juliana, method B, Score 4, Juliana, method C,
        Score 1, Felix, method A, Score 1, Felix, method B, Score 1, Felix, method C,
        Score 2, Felix, method A, Score 2, Felix, method B, Score 2, Felix, method C,
        Score 3, Felix, method A, Score 3, Felix, method B, Score 3, Felix, method C,
        Score 4, Felix, method A, Score 4, Felix, method B, Score 4, Felix, method C
    C. 3; Method A, method B, method C
    D. 2; Juliana, Felix
    E. 4; Score 1, score 2, score 3, score 4

35. 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 factor(s) and the number of levels for each.

    35. _____

    A. Sunny, shady (2 levels)
    B. No fertilizer, small amount of fertilizer, large amount of fertilizer (3 levels)
    C. Fertilizer (3 levels), blocking variable – location (2 levels)
    D. 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 (6 levels)
    E. Fertilizer (3 levels), location (2 levels)

Identify the flaw(s) in the experiment or study described.

36. Researchers reported that for men, being unmarried increases the risk of depression. These findings were based on the medical records of 400 married men and 500 unmarried men. Since there is no random assignment, this conclusion is not justified because there may be lurking variables. Which of the following are possible lurking variables?

        36. _____

      I: Rate of depression
      II: Income
      III: Type of employment
      IV: Age
      V: Gender

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

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

37. Is the Addison Wesley Algebra I text superior to the currently used text, in promoting learning of algebra? Evaluators only are informed that Group A will test from the current text and Group B will test from AW text.

        37. _____

    A. Single–blind   B. Double–blind   C. Neither

38. Is the aspirin produced by World's Best Pharmaceutical Company better than that of a competitor at relieving headaches? 200 headache suffers are chosen at random. Migraned 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.

        38. _____

   A. Single–blind   B. Double–blind   C. Neither

39. Does a new brand of hand lotion cause an allergic reaction in some people? Participants are allowed to join one of three studies. Two of the studies use well–known name brand lotions and the third is the"NEW" lotion. The results document will be prepared by a noted dermatologist, who is informed of the composition of each group.

        39. _____

    A. Single–blind   B. Double–blind   C. Neither

Answer the question.

40. A new type of pain reliever is administered to 30 consenting post–operative patients in various hospitals. Although the pain reliever has already been tested for safety and effectiveness, this experiment is to observe and categorize any side–effects. Because of maturity and body mass, it is decided to test the adults separately from the children.

40. _____
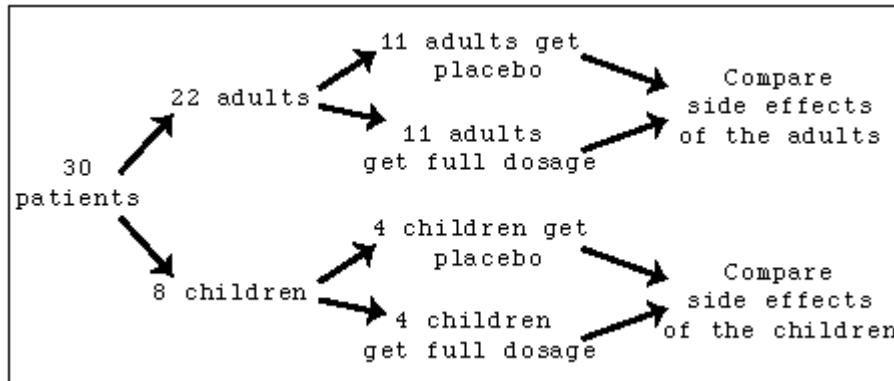
The grouping of the adults separate from the children is an example of what?
   A. Reduction of confounding factors
   B. Matching
   C. Controlling
   D. Stratifying
   E. Blocking

Identify the flaw(s) in the experiment or study described.

41. 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.

41. _____

   A. The volunteers should have been randomly selected.
   B. The doctor should choose the best treatment for each patient, instead of allowing volunteers to be assigned at random to a treatment.
   C. There could be lurking variables.
   D. The experiment is only single blind. The doctor evaluating the patients' progress is not blind to which treatment patients received.
   E. There is no blocking.

1. E
2. C
3. A
4. B
5. D
6. B
7. B
8. E
9. E
10. B
11. A
12. D
13. B
14. D
15. A
16. D
17. A
18. B
19. E
20. A
21. A
22. B
23. E
24. E
25. A
26. E
27. B
28. E
29. C
30. B
31. A
32. A
33. E
34. A
35. E
36. E
37. A
38. B
39. C
40. E
41. D