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

1) Which of the following sample designs does NOT contain a source of bias?

A) A teacher asks high school students how often they drink alcohol.
B) All 250 students at a review session are given numbered tickets. Five numbers are chosen randomly, and the individuals with the winning ticket numbers each win a $10 gift card.
C) A legislator wishes to know how his district feels about a particular issue. As a result, his office e-mails a long, detailed survey about the issue to a random sample of adults in his district.
D) A polling organization uses the telephone directory to randomly select adults for a telephone survey to obtain opinions on the current president.
E) A news show asks viewers to call a toll-free number to express their opinions about their choice for president.

2) A group of 420 college students are enrolled in a blind taste test. The school’s food service wants to see if they can improve the taste of their lattes. They decide to try two types of coffee beans (Arabica and Robusta); three types of syrup (vanilla, hazelnut, and mocha); and two types of milk (soy and low fat). The best combination of ingredients is sought. The latte experiment will have:

A) 3 factors, 12 levels, and 420 treatments
B) 2 factors, 7 levels, and 420 treatments
C) 3 factors, 7 levels, and 420 treatments
D) 2 factors, 3 levels, and 12 treatments
E) 3 factors, 7 levels, and 12 treatments

3) A company wants to compare two washing detergents (Brands A and B) to see which best keeps colors from fading. Twenty new, identical red t-shirts will be used in the trials. Ten t-shirts are washed 15 times with Brand A in warm water. The other 10 t-shirts are washed with Brand B in cold water. The amount of fading is rated on a 0 to 100 scale, and the mean for the t-shirts washed in Brand A is compared to the mean for the others. Is this a good experimental design?

A) Yes.
B) No, because more temperatures of water should be used.
C) No, because more than two brands of detergent should be used.
D) No, because the water temperature is confounded with brand of detergent.
E) No, because the means are not the proper statistics for comparison.
4) A human resources director of a large company is interested in how often employees use their computers during breaks. She watches a selected group of employees at their desks during the break times. This study would be described as:

   A) a survey  
   B) a census  
   C) an observational study  
   D) a sample  
   E) an experiment

5) The head of the admissions office at a small college wants to understand why minority students who visit her school do not eventually enroll. The college holds a preview weekend for students who have been admitted. Two months later, after the students have decided what college to attend, a survey is sent out to all minority students who attended the weekend visit but who did not choose to attend this college. About a third of them returned the survey, with 48% of those indicating that they received a larger scholarship offer elsewhere. Which is true?

   I. The population of interest is all potential college students.  
   II. This survey design suffered from non-response bias.  
   III. Because it comes from a sample, 48% is a parameter, not a statistic.

   A) I and II only  
   B) I, II, and III  
   C) II only  
   D) I only  
   E) II and III only

6) The primary reason for using blocking when designing an experiment is to reduce:

   A) confounding  
   B) the sensitivity of the experiment  
   C) variation  
   D) bias  
   E) the need for randomization

7) Twenty men and 20 women with migraine headaches were subjects in an experiment to determine the effectiveness of a new pain medication. Ten of the 20 men and 10 of the 20 women were chosen at random to receive the new drug. The remaining 10 men and 10 women received a placebo. The decrease in pain was measured for each subject. The design of this experiment is:

   A) randomized block, blocked by drug and gender.  
   B) randomized block, blocked by gender.  
   C) randomized block, block by drug.  
   D) completely randomized with one factor, drug.  
   E) completely randomized with one factor, gender.
8) The state would like to evaluate the usefulness of a program to randomly test high school athletes for steroid use. Initially, a state agency will test athletes in all 20 schools in Fort Worth, randomly selecting 3 athletes from each school. Is this a simple random sample of student athletes in Forth Worth?

A) No, because not all possible groups of 60 athletes could be in the sample.
B) Yes, because each athlete is equally likely to be chosen.
C) No, because a random sample of Ft. Worth schools is not chosen.
D) Yes, because athletes will be chosen at random.
E) Yes, because stratified sampling is a special case of simple random sampling.

9) A student organization wants to assess the attitudes of students toward a proposed change in the hours the library is open. They randomly select 50 freshmen, 50 sophomores, 50 juniors, and 50 seniors to survey. This situation is described as:

A) a stratified random sample
B) a simple random sample
C) a systematic random sample
D) an observational study
E) a convenience sample

10) A college counselor would like to select a simple random sample of all the 525 students in the college. She uses the numbers from 001 to 525 to number the students in a college database and then uses a random number table to choose her sample of 30. What numbers correspond to the first 5 students chosen?

06385  61327  51790  63618  23145  46124  20031

A) 63  85  61  32  45
B) 063  132  517  361  145
C) 063  132  182  314  124
D) 063  327  361  145  242
E) 06  38  56  13  24