Statistics 2215 Name _____
Test #2
Spring 2004

Part I

1. The sample size is four. How do you find the **standard error** required for the calculation of the t-statistic? (List all the steps in the calculation.)

2. True of false and **why**? All mutually exclusive events are dependent events.

3. "Trials are independent, trials are fixed in number, and trials…." Finish the statement and identify the distribution.

4. What's the difference between the population standard deviation and the standard deviation of the sampling distribution of the mean?

5. I know the population mean is 6—how do I find the mean of the sampling distribution of the mean based upon the same population?

6. What role does the sample mean play in determining the appropriate alternative hypothesis?

7. The p-value is the lowest _____ at which the null hypothesis could have been _____.

8. What does $\Sigma(x - x)$ have to do with finding degrees of freedom for the t-statistic?

9. Where $z = k = 1.96$ make the appropriate probability statement for a) Chebyshev's Theorem and b) the Central Limit Theorem.

10. I've formed 1000 "99% confidence intervals" from 1000 samples of size 50 taken from the same population. How many of these intervals would you expect to "work," that is, to capture the population mean, μ? Explain.

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Part II

SHOW ALL CALCULATIONS

1. a) In a small high school there are 42 senior women each of whom is eligible to be homecoming queen or first runner up or second runner up to the homecoming queen In how many ways can these three positions be filled from the 42 senior women?

   b) When a fair coin is tossed two times, there is a 25% chance of getting 0 heads and a 50% chance of getting 1 head. What is the chance of getting 2 heads?

2. The statistician for a chain of 24-hour grocery stores in San Antonio, Texas, estimates that the probability that a customer who enters one of the stores between midnight and six a.m. will buy beer is .25. The probability that a customer entering the store during this time period will buy potato chips is .4. The probability that a customer entering the store during this time period will buy both beer and potato chips is .1. What is the probability that a customer entering the store during this time period will buy either beer or chips or both?

3. A quiz consists of 15 multiple-choice questions. Each question has 5 choices, with exactly one correct choice. A student, totally unprepared for the quiz, guesses on each of the 15 questions.
   How many questions should the student expect to answer correctly?
   What is the standard deviation of the number of questions answered correctly?

4. The mean speed of a passenger car on Interstate 94 is μ equals 73 mph with a standard deviation of 5. What is the minimum probability that the next time we point our radar gun at a passenger car driving along Interstate 94 the car we target will be going between 58 and 88 mph? Do not assume a normal distribution.

5. Find the area under the standard normal curve for all z values that are farther than 1.75 from 0.

6. A normal curve with mean = 25 has an area of .3531 between 25 and 34. What is the standard deviation for this normal curve?

7. A telemarketer makes a sale on 25% of his calls. If he makes 300 calls in a night, what is the probability that he will make more than 70 sales but less than 90 sales?

8. The mean life of a certain tire used on taxi cabs is 55,000 miles with a standard deviation of 7000 miles. If the taxi company buys 100 of these tires for its 25 taxis, what is the probability that the mean life of these 100 tires will be less than 54,000 miles?

9. A test was done to determine whether putting a certain cereal on the top shelf in a grocery store improved weekly sales from an average of 150 boxes per week. For twenty-six weeks the cereal was moved from the bottom to the top shelf. These 26 weeks produced average weekly sales of 160 boxes with a standard deviation of 20 boxes. Is this evidence at the 5% level to conclude that the top shelf increases sales of this cereal?

10. A brokerage company has two finalists for one trader position. The company likes candidate A better than candidate B, but will hire B if there is evidence that B is a more profitable trader. Looking at a random sample of 100 trades for each candidate the company determines the mean and standard deviation of profit per trade for each to be:

    For A: mean profit = $5000, standard deviation $500.
    For B: mean profit = $6000, standard deviation $5000.

    Set up the appropriate hypothesis and test at the 0.05 level of significance. Use the p-value approach.

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