1. A jar has 3 red balls, 2 white balls and 1 blue ball. A ball is selected, the color recorded, returned to the jar and a second ball is selected. List all possible outcomes of this experiment (this is the sample space).
2. Find the mean and standard deviation for the normal distribution where 68% of the data falls between 35 and 67. Assume the data is symmetric about the mean.
3. A fair coin is tossed twice. Make a theoretical probability distribution for the random variable, X, the number of heads.
4. Set up a worksheet to simulate tossing 3 coins. Make two of the coins fair and the other have a probability of heads = .7. Make an empirical probability distribution for x = number of heads for the three coins. Use at least 1000 simulations and a pivot table.
5. Set up a simulation to model a tour bus that has 32 seats but sells 36 tickets. Assume the probability that a ticketed passenger doesn't show is 10%. Run the simulation 10 times, record whether or not you need to bump passengers for each simulation and use your results to estimate the likelihood of no passengers being bumped. Do you think the company needs to adjust its ticketing strategy?
6. Set up a binomial distribution to model the tour bus problems above. What is the probability exactly 32 ticketed passengers show up? What is the probability more than 32 show up?
7. A fair coin is tossed five times. Set up an Excel worksheet that simulates the five tosses of the coin and calculates the number of heads that turn up. Use a Data Table to simulate 5000 trials. Make a histogram Using a pivot table. (Be sure to set appropriate bin widths, labels, etc.) Make an empirical probability distribution table for the random variable, X, the number of heads from the results of the 5000 trials.
8. A fair coin is tossed five times. Use Excel's Binomial Distribution function to create a theoretical probability distribution table for the random variable, X, the number of heads. Compare the two probability distributions (in 8 and 9).
9. A particular game consists of tossing a fair coin 5 times. It costs $1 to play the game; you win $3 if 0 or 1 heads turn up, you win $1 if 2 or 3 heads turn up and you win nothing if 4 or 5 heads turn up. Find the expected value of your net winnings. Is the game in your favor, or in the favor of the "house"? (Hint, your results for 7 or 8 will be useful in this problem.)
10. A 25 question, multiple guess quiz is given to a class. Each question has 3 answers to select from. Let x be the number of questions answered correctly. Use the binomial distribution to find: a. $P(x = 20)$ b. $P(x < 20)$ c. $P(x \leq 25)$ d. $P(x > 15)$ e. $P(15 \leq x \leq 22)$
11. A loaded coin is tossed twice. The probability of heads on one toss is 40%. Make a theoretical probability distribution for the random variable, X, the number of heads.
12. Set up a worksheet to simulate rolling two dice and finding the sum of the two die. Use your results to estimate the probability of rolling: a. 3 b. 6 Compare these empirical values to the theoretical values.
13. Sketch the symmetric area under a normally distributed curve that represents 68% of the data by marking the mean and the appropriate number of standard deviations.
14. 2500 students take a college entrance exam. The scores on the exam have an approximately normal distribution with mean 52 points and standard deviation 11 points. Find the following: a) What percent of the students scored higher than 68? b) How many students scored higher than 68? c) If Sue scored 57 on the test, she scored higher than what percent of the students? d) If the top 10% of the students get a scholarship, what is the cut-off score for the scholarship? e) How many scores would be expected to be between 40 and 60?