Statistics for Business – List 2

Probability Distributions

1. A recent study conducted by Penn, Shone, and Borland, on behalf of LastMinute.com revealed that 52 percent of business travelers plan their trips less than two weeks before departures. The study is to be replicated with a sample of 12 frequent business travelers.
   a. Develop a probability distribution for the number of travelers within two weeks of departure.
   b. Find the mean and the standard deviation of this distribution.
   c. What is the probability exactly 5 of the 12 selected business travelers plan their trip within two weeks of departure?
   d. What is the probability 5 or fewer of the 12 selected business travelers plan their trip within two weeks of departure?

2. A manufacturer of computer chips claims that the probability of a defective chip is .002. The manufacturer sells chips in batches of 1000 to major computer companies such as Dell and Gateway.
   a. How many detective chips would you expect in a batch?
   b. What is the probability that none of the chips are defective in a batch?
   c. What is the probability at least one chip is defective in a batch?
   Hint. You can apply here the Poisson P(np) or the binomial b(n=1000,p=0.002) distribution.

3. Suppose 1.5 percent of the antennas on new Nokia cell phones are defective. For a random sample of 200 antennas, find the probability that:
   a. None of the antennas is detective.
   b. Three or more of the antennas are detective.
   Hint. Use the binomial distribution.

4. A cola-dispensing machine is set to dispense on average 7.00 ounces of cola per cup. The standard deviation is 0.10 ounces. The distribution amounts dispensed follows a normal distribution.
   a. What is the probability that the machine will dispense between 7.10 and 7.25 ounces of cola?
   b. What is the probability that the machine will dispense 7.25 ounces of cola or more?
   c. What is the probability that the machine will dispense between 6.80 and 7.25 ounces of cola?

5. The amounts of money requested on home loan applications at Down River Federal Savings follow the normal distribution, with a mean of $70,000 and a standard deviation of $20,000. A loan application is received this morning. What is the probability:
   a. The amount requested is $80,000 or more?
   b. The amount requested is between $65,000 and $80,000?

6. The mean starting salary for college graduates in the spring of 2005 was $36,280. Assume that the distribution of starting salaries follows the normal distribution with a standard deviation of $3,300. What percent of the graduates have starting salaries:
   a. Between $35,000 and $40,000?
   b. More than $45,000?
   c. Between $40,000 and $45,000?

7. A population of unknown shape has a mean of 75. You select a sample of 40. The standard deviation of the sample is 5. Compute the probability the sample mean is
   a. Less than 74.
   b. Between 74 and 76.
   c. Between 76 and 77.
   d. Greater than 77.
   Hint. Notice that the sample mean is approximately N(75,25/40).

8. The mean rent for a one-bedroom apartment in Southern California is $2,200 per month. The distribution of the monthly costs does not follow the normal distribution. In fact it is positively skewed. What is the probability of selecting a sample of 50 one-bedroom apartments and finding the mean to be at least $1,950 per month? The standard deviation of the sample is $250.
   Hint. The mean is approximately N(2200,250*250/50)