***E370, Spring 2016***

***Lab Activities week of 2/15/2016***

***Valued at 25 points***

Solve the following problems. Please write the command you use for any calculations as well as the result to obtain full credit. (round your answer to 4 decimal places)

1. Mr. White is traveling to London for a 10-day vacation. The weather in London is highly unpredictable. Every day there is a 50 percent chance of raining and a 50 percent chance of shining. Use the information to answer the following questions.
   1. (1 point) What is the probability that Mr. White will get exactly 3 sunny days?
   2. (1 point) What is the probability that Mr. White will get more than 3 sunny days?
   3. (2 point) What is the probability that Mr. White will get between 2 and 4 sunny days?
   4. (2 point) Mr. White’s itinerary has 6 days of outdoor activities, and he only goes outdoor when there is no rain. What is the probability that he will be able to complete his outdoor activities in these 10 days?
   5. (2 points) What are the expected number of sunny days and their standard deviation?
   6. (1 point) Determine the shape of the distribution of sunny days.
2. Mr. Green, who is responsible for the quality of bottles in a beer factory, has been observed for a long time that the probability that a bottle is non-defective is 80%.
   1. (3 points; +2 for the table and +1 for the chart) Randomly select 10 bottles. Calculate the probability distribution of bottles being non-defective and record it in the table. Create a chart with the probabilities you calculated and sketch it next to the table. Please label your chart appropriately.

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* 1. (1 point) What is the probability that 4 bottles are defected?
  2. (2 point) What is the probability that at least 4 bottles but fewer than 9 are non-defective?

* 1. (1 point) What is the expected number of non-defective bottles out of 10?
  2. (1 point) What is the standard deviation of the number of non-defective bottles out of 10?
  3. (1 point) Determine the shape of the distribution of non-defective bottles.
  4. (3 point) Select 50 bottles at random and create a chart for this distribution. Compare and contrast this to the charts from parts a.
  5. (1 point) Does the shape of the distribution depend on *n*, the number of sample?
  6. (2 point) Suppose the probability of a bottle being non-defective is 20% instead of 80%, what is the shape of the non-defective bottles in a sample of 10 bottles? Compare and contrast this to the distribution in part a.
  7. (1 point) Does the shape of the distribution depend on π, the probability of being non-defective?