Math 106 Spring 2010
APPENDIX A-The Binomial Distribution
Motivation to Binomial Distributions

I just decided to make more money, since I am a very good cook :) I decided to make baklavas which is a very exotic desert and want to sell it at local fairs and sporting events around Gambier. I make baklavas with different flavors: Pistachio, Walnut, Pecans, and Hazelnuts.
I did an experiment, and figured out the probabilities of each flavor to be purchased by the next customer.

Flavor	Pistachio	Walnut	Pecan	Hazelnut
Probability	0.4	0.2	0.3	0.1

You may assume that the customers choose flavors independently.

Let's answer the following questions:

1. What is the probability that of the next two customers, both request pistachio?
2. What is the probability that of the next two customers, exactly one requests pistachio?
3. What is the probability that of the next three customers, only one requests pistachio?
4. What is the probability that of the next three customers, exactly two request pistachio?

   Let us see whether we can do the following questions as easy as the previous ones?
5. What is the probability that of the next 6 customers, exactly one wants pistachio?
6. What is the probability that of the next 6 customers, exactly two want pistachio?
7. What is the probability that of the next 6 customers, exactly x want pistachio?

More in class-activities:

1. Suppose a pair of fair dice is rolled 30 times and each time the pair is rolled, their sum is observed.
   (a) What's the chance that a 9 is observed on 5 rolls among 30?
   (b) What's the chance of observing less than five 9's?
   (c) What's the chance of observing between one and five 9's?
   (d) What happens if we increase n=number of trials?

2. 25% of the customers entering Kroeger between 5 and 7 pm use an express check out. Consider 15 randomly selected customers and let x denote the number people among 15 who use the express. Compute the following:
   (a) $P(x = 2)$
   (b) $P(x \leq 1)$
   (c) $P(2 \leq x)$
   (d) $P(x \neq 2)$