Notes 4.2 Binomial Distributions

I. Binomial Experiments

There are four conditions that must be satisfied in order for a probability experiment to be a binomial experiment:

1.

2.

3.

4.

Notation for Binomial Experiments:

Symbol	Description
n	
$p = P(S)$	
$q = P(F)$	
x	

Example 1:
Decide whether each of the following is a binomial experiment. If it is, specify the values of *n, p*, and *q* and list the possible values of the random variable *x*. If it is not, explain why.

a. A certain surgical procedure has an 85% chance of success. A doctor performs the procedure on eight patients. The random variable represents the number of successful surgeries.

b. A jar contains five red marbles, nine blue marbles, and six green marbles. You randomly select three marbles from the jar, without replacement. The random variable represents the number of red marbles.

c. You take a multiple choice quiz that consists of 10 questions. Each question has four possible answers, only one of which is correct. To complete the quiz, you randomly guess the answer to each question. The random variable represents the number of correct answers.

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II.   Binomial Probabilities

Example 2:
A card is selected from a deck and replaced. If this experiment is repeated a total of five times, find the probability of selecting exactly three clubs.

Example 3:
Michael Jordan has an 85% free throw shooting percentage. If he shoots ten free throws, find each of the following probabilities:

   a. making exactly seven shots   b. making at least eight shots

   c. making no more than five shots   d. missing exactly four shots
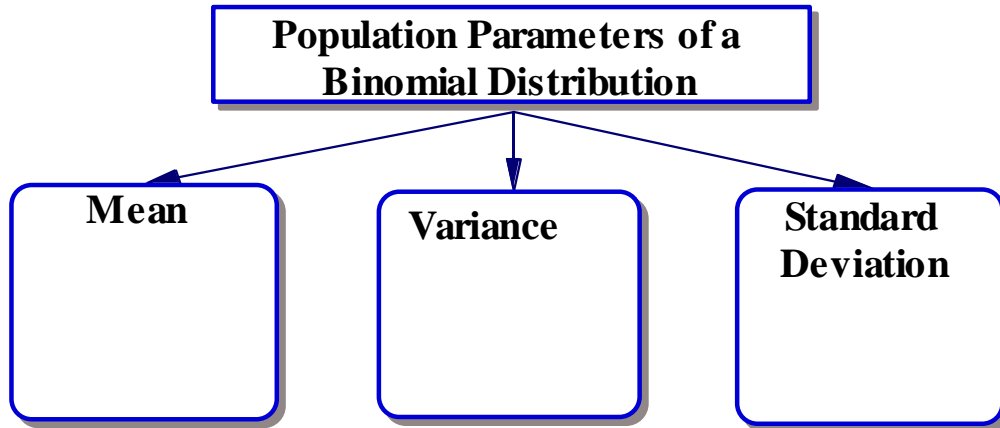
Example 4:
A survey indicates that 21% of American men consider fishing as their favorite leisure-time activity. You randomly select five men and ask them. Find each of the following probabilities:

   a. exactly two of them respond yes   b. at least two of them respond yes

   c. fewer than two of them respond yes

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III. Mean, Variance, and Standard Deviation

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┌─────────────────────────────────┐
│   Population Parameters of a     │
│     Binomial Distribution        │
└─────────────────────────────────┘
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┌──────────────┐   ┌──────────────┐   ┌──────────────┐
│    Mean      │   │   Variance   │   │   Standard   │
│              │   │              │   │   Deviation  │
│              │   │              │   │              │
└──────────────┘   └──────────────┘   └──────────────┘
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Example 5:

In San Diego, California, 38% of the days in a year are clear. Find the mean, variance, and standard deviation for the number of clear days during the month of May. Interpret the results and determine any unusual values.

Assignment: New: pgs 216 – 218/ 7, 8 – 9, 10, 15, 18, 23, 26 – 27 (d – g only)

Old: pgs 173 – 174/ 3,   6,   7, 10,   14 – 15 (c – f only)