= doubles = nut double Warm-up Probability_Distributions geompdf=20 In the board game Monopoly, one way to get out of jail is to roll doubles. The random variable of interest is Y=number of attempts it takes to roll doubles one time. On each roll, the $P(X \leq \frac{1}{2})$ robability of success is 1/6. Find the probability that you roll a double within 3 turns. 5 Find the probability that it takes more than 3 turns to roll doubles, and interpret this value in context. **Objectives** Check homework Content: I will use a binomial model to calculate probabilities. Social: I will listen and participate in the class discussion. he Binomial Model Language: I will clarify which phrases determine a binomial model vs. those which determine a geometric model.

Objectives

- Content Objective: I will use a binomial model to calculate probabilities.
- Social Objective: I will listen and participate in the class discussion.
- Language Objective: I will clarify which phrases determine a binomial model vs. those which determine a geometric model.

The Geometric Model

- The number of trials until our first success.
- Waiting time



The number of successes in a given number of trials

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The Binomial Model

- A Binomial model tells us the probability for a random variable that counts the number of successes in a fixed number of Bernoulli trials.
- Two parameters define the Binomial model: n, the number of trials; and, p, the probability of success. We denote this Binom(n, p). probability

Objectives

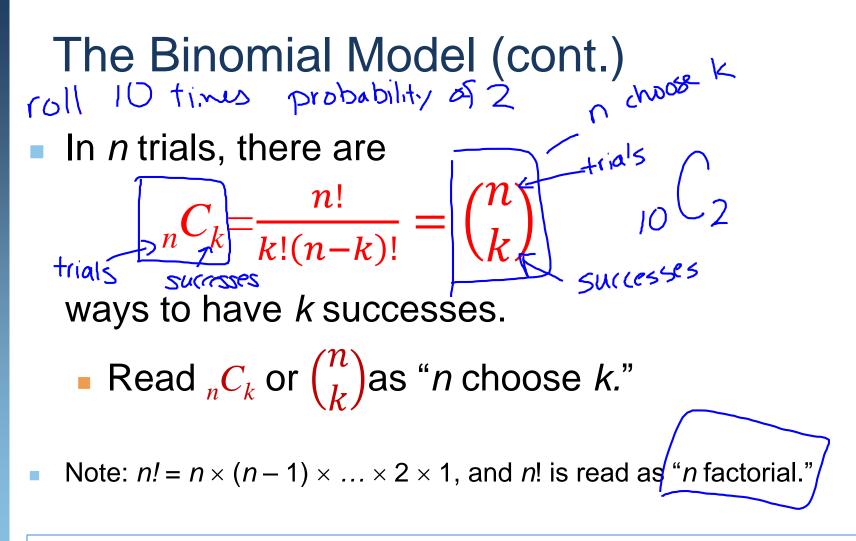
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Content: I will use a binomial model to calculate probabilities.

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Objectives

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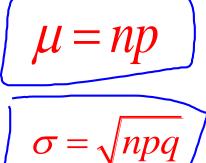
The Binomial Model (cont.)



Binomial probability model for Bernoulli trials: Binom(n,p)

- n = number of trials
- p = probability of success
- q = 1 p = probability of failure

X = # of successes in *n* trials



$$P(X = x) = C_x p^x q^{n-x}$$

Objectives

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Example

Back to the speckled M&M's. Remember that 30% of the M&M in a bag are speckled

- If I have a handful of 5 candies, how many speckled ones do I expect to get? M = np = 5(0.3) = 1.5 candies man E(X)
- What is the standard deviation of the number of candies I will get? $T = \int DPg = ((5)(0.3)(0.7)) = 1.0247$ candles
- What is the probability that we will find 2 speckled ones in a handful of 5 candies? $P(X=2) = r(x p' q') = \frac{5}{2!3!} (0.3)^2 (0.7)^3 = 10(0.3)^2 (0.7)^3$ $P(X=2) = 5(2(0.3)^2 (0.7)^3 = \frac{5}{2!3!} (0.3)^2 (0.7)^3 = 0.30\%$

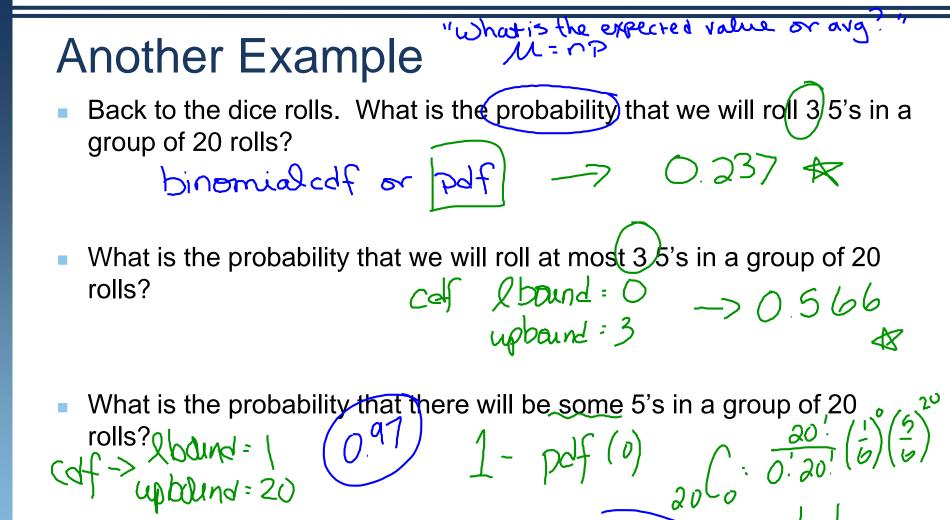
• What is the probability that we will find at least 2 speckled ones in a handful of 5 candies? $P(X=2) \circ R P(X=3) \circ r P(X=4) \circ P(X=5) = \left| -\left(\frac{P(X=1) + P(X=0)}{P(X=2) \circ R P(X=3)} \right) \right|$

Objectives

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Point binomcdf (5,0.3) 2 5 Johne binomial polf. Probability cummulatit binomialcof mulaple values P(X=2) = P=0.3D.308 X-value = 2 (successes) of +rials 1000 B111+7 P(X at least 2) = -> (),47 lower bound = 2 upperbound = 5



Calculator "Tricks"

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Scrabble

- In the game of scrabble, each player begins by drawing 7 tiles from a bag containing 100 tiles. There are 42 vowels, 56 consonants, and 2 blank tiles in the bag.
 - What is the probability of all 7 drawn being a vowel?

What is the probability that some of the 7 are vowels?

- What is the probability that the vowel is the 2nd or 3rd draw?
- How long should we expect to wait to draw a vowel?

Objectives

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Objective Recheck

- Content Objective: I will use a binomial model to calculate probabilities.
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Homework

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