Binomial v. Geometric

- The primary difference between a binomial random variable and a geometric random variable is what you are counting.
- A binomial random variable **counts the number of "successes"** in n trials.
- A geometric random variable **counts the number of trials up to and including the first "success."**

Calculator: PDF

PDF = precisely (exactly) a certain value

Example: P (X = 2)

TI 84: binompdf(n,p,r)
TI 89: binomial Pdf

n = number of trials
p = probability of success
r = number of success

Binomial vs. Geometric

The Binomial Setting	The Geometric Setting
1. Each observation falls into one of two categories.	1. Each observation falls into one of two categories.
2. The probability of success is the same for each observation.	2. The probability of success is the same for each observation.
3. The observations are **all** independent.	3. The observations are **all** independent.
4. There is a fixed number *n* of observations.	4. The variable of interest is the number of trials required to obtain the 1^{st} success.

Calculator: CDF

CDF = cumulative distribution. The probability of getting that value or something smaller.

Example: P (X ≤3)

TI 84: binomcdf(n,p,r)
TI 89: binomial Cdf

n = number of trials
p = probability of success
r = number of success

FRQ Answers Must Include:

1. **Name of distribution**
   Geometric, Binomial
2. **Parameters**
   Binomial: X (define variable), n & p
   Geometric: X (define variable), p
3. **Probability Statement**
   Ex: P (X = 7) or P (X ≥ 3)
4. **Calculation and p-value**
   Calculator notation is okay, but needs to be labeled.
5. **Solution interpreted in context.**

Calculator: 1- CDF

1 – cdf = The probability of getting that value or something greater

Example: P (X ≥ 8).

1 – bimoncfd (n-1, p, r)

*** Must reduce n by 1, too***

Twenty-five percent of the customers entering a grocery store between 5 p.m. and 7 p.m. use an express checkout. Consider five randomly selected customers, and let X denote the number among the five who use the express checkout. What is the probability that two customers used the express check out?

Binomial & Normal

The binomial distribution can be approximated well by a normal distribution if the number of trials is sufficiently large.

A normal distribution can be used to approximate the binomial distribution if np is at least 10 and n(1-p) is at least 10.

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Binomial Distribution
N= 5
P = 0.25

X = # of people use express
P (X =2)

Suppose we have data that suggest that 3% of a company's hard disc drives are defective. You have been asked to determine the probability that the first defective hard drive is the fifth unit tested.

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binompdf(5, 0.25, 2) = .2637
5= number of customers
0.25= probability of success
2= number of successes desired

There is a 26.37% chance that exactly 2 customers will use the express checkout lane between 5pm and 7pm.

Suppose we have data that suggest that 3% of a company's hard disc drives are defective. You have been asked to determine the probability that the first defective hard drive is the fifth unit tested.

Geometric Distribution
P = 0.03
X = # of disc drives till defective
P (X = 5)

Suppose we have data that suggest that 3% of a company's hard disc drives are defective. You have been asked to determine the probability that the first defective hard drive is the fifth unit tested.

Geometpdf (0.03, 5)
0.03= p = probability of defect
5 = n= tests until defect found

P = 0.0266

There is a 2.66% percent chance that the first defective hard drive is the fifth unit tested.