Bernoulli and Binomial distribution - Ken, Noha, Luok

What is the question you came up with for this scenario?
Bernoulli – What are the probabilities of picking a white colony on a plate?
Binomial – What are the probabilities of getting X number of white colonies when we pick from a plate for N number of times?

More generally, what kind of problem is the function typically used for?
Bernoulli - What is the probability of success out of all the failures?
Binomial - What is the probability of success out of (x) number of trials? [need to think about this]

How is the distribution parameterized?

From Kris's lecture notes on XDASI-W5.C2:
a) Bernouli:

$$f(x) = P(X = x) = \pi^x(1-\pi)^{1-x}, \quad x \in \{0, 1\}$$

π - probability of success
X - no. of successful events, which in Bernoulli's case, is either 1 or 0.

b) Binomial:

$$f(x) = P(X = x) = \binom{n}{x}\pi^x(1-\pi)^{n-x}, \quad x \in \{0, 1, \ldots, n\}$$

π - probability of success
X - no. of events.
N choose x - means the number of ways the success can happen

**From : Whitlock & Schluter, Chapter 7: Analyzing proportions**

## Binomial Distribution

Formula: Pr[X successes]= (n choose x)px(1-p)n-x, where p is the probability of success in each trial, X is the number of successes, and n is the

number of trials.

## Binomial Proportion

Estimate: p^=X/n

Standard error: The standard error of a proportion is estimated by

SEp^= √ p^(1−p^)/n

Test statistic: The observed number of successes, X.

Formula: P=2(i=xxPr[i successes]) for X/n > p0 or P=2(i=0x=Pr[i successes]) for X/n < p0 ,

where X is the observed number of successes, n is the sample size, and Pr[i successes] is the

probability of obtaining i successes from n trials given by the binomial distribution.

What do the PDF and CDF represent, in general terms?

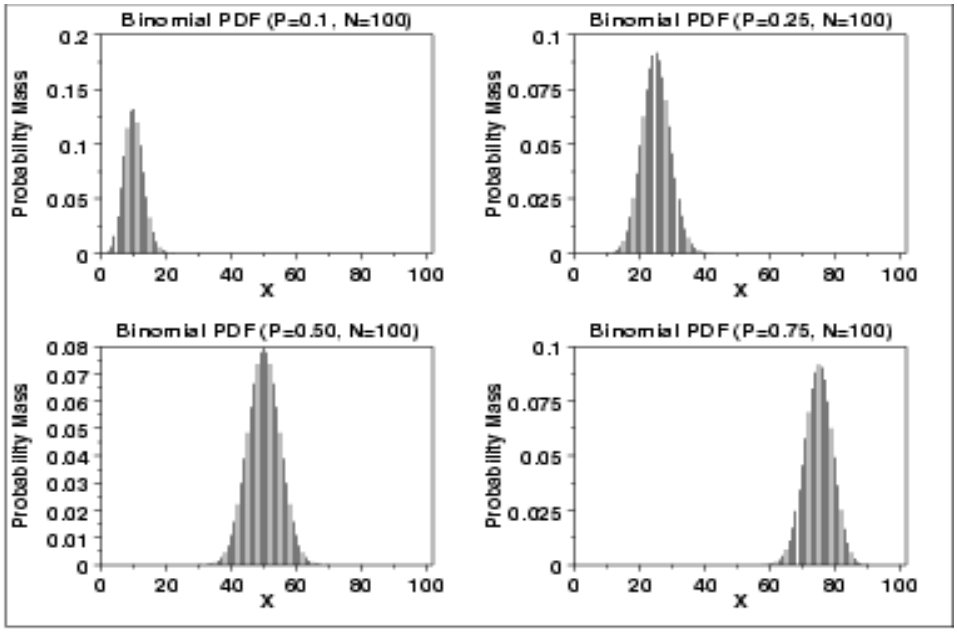
For Bernoulli: The probability of success in one trial

For Binomial: The probability of a particular outcome (success) out of X number of trials.

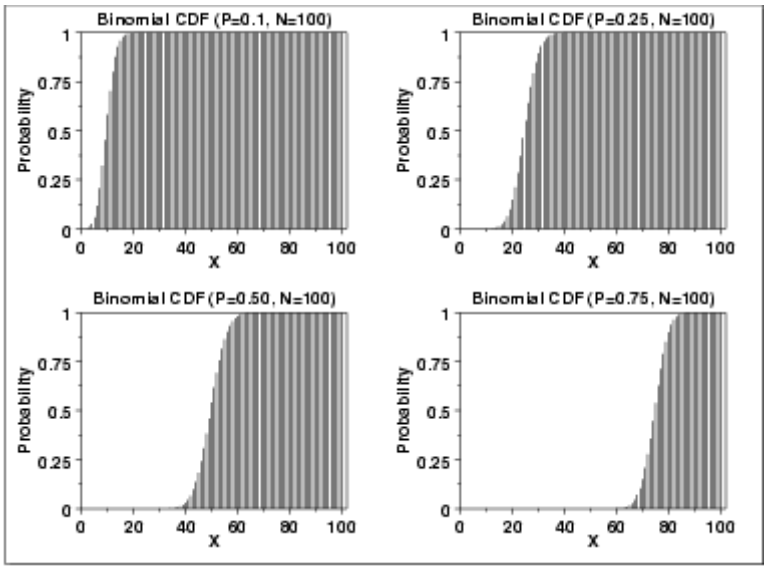
What do the PDF and CDF for this distribution look like, generally speaking?

The following is the plot of the binomial probability density function for four values of *p* and *n* = 100

https://www.itl.nist.gov/




The following is the plot of the binomial cumulative distribution function with the same values of $p$ as the pdf plots above.




How does changing parameter values affect the probability distribution?

Changing the

Identify at least one other distribution that yours relates to and be prepared to discuss the relationship between them. This could be a special case, a limiting case, an approximation, or an inverse CDF (survival) relationship.

"Normal Distribution. This is because many statistical methods assume that the data follows a normal distribution. Therefore, it can be said that if we do many samples, there is a chance that data follows a normal distribution."