

Definitions

Binomial Setting

- A **binomial setting** is a situation in which a fixed number of trials are performed testing a chance process and the number of times that a particular outcome is recorded.
- There are **four conditions** that must be true for a situation to be binomial, with the acronym **BINS**:
 - ▷ **Binary** - Each trial has only two possible outcomes.
 - ▷ **Independent** - The trials must be independent.
 - ▷ **Number** - The number of trials must be set in advance
 - ▷ **Success** - Each trial has the same probability of success.

Sampled Data

If you have an SRS of a population, you may treat it as a binomial setting if:

$$np \geq 10$$

$$n(1-p) \geq 10$$

Binomial distribution

- **Binomial random variable** - the number of successes, X , in a binomial setting.
- **Binomial distribution** - the probability of getting X successes in a set of trials. The parameters are:
 - ▷ n , the **number of trials** in each set
 - ▷ p , the **probability** of a success in each trial.

Calculating Probabilities

- **Binomial Coefficient**, ${}_n C_k$ or $\binom{n}{k}$ - the number of ways of getting k successes in a set of n trials.

$${}_n C_k = \frac{n!}{k!(n-k)!}$$

k - number of successes in the set; n - number of trials in the set

- **Binomial Probability**, $P(X = k)$ - the probability of getting k successes in a set of n trials

$$P(X = k) = ({}_n C_k) p^k (1-p)^{n-k}$$

k - number of successes; n - number of trials in the set; p - probability of success in a single trial

- **Mean, μ_X , and Standard Deviation, σ_X**

$$\mu_X = np$$

$$\sigma_X = \sqrt{np(1-p)}$$

Calculator Note

On your graphing calculator, two functions will calculate a binomial probability:

- **binompdf** $P(X = k)$
- **binomcdf** $P(X \leq k)$