**Conceptual Tools**

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**Probability**

**Binomial Dist/Bernoulli Trials**

**Binomial Distribution Approx**

**Tool:** For large $n$ and $p \approx 1/2$, the binomial distribution approximates a normal (or gaussian) distribution with mean $\mu = np$ and standard deviation $\sigma = \sqrt{npq}$.

**Tool:** For large $n$ and $p \approx 1/2$, the binomial distribution summed from $m = 0$ to $m = r$ approximates the cumulative distribution of a normal (or gaussian) distribution with mean $\mu = np$ and standard deviation $\sigma = \sqrt{npq}$. In other words, the following equation applies:

$$
\sum_{m=0}^{r} \binom{n}{m} p^m q^{n-m} = F(z) \quad \text{where} \quad z = \frac{r + \frac{1}{2} - np}{\sqrt{npq}} \quad \text{and} \quad Z \sim n(\mu = 0, \sigma = 1)
$$