Binomial Distributions

\( Y \): # of success in \( n \) success/failure independent and identically distributed tools, each one with probability \( p \) of success

\[ Y \sim \text{Binomial} \left( n, p \right) \quad n = \# \text{ of trials } = 0, 1, 2, 3, \ldots \]

\( p \) = the probability of success \( p \in [0, 1] \)

Ex:\( n = 5 \) \( p = \frac{1}{2} \) \( Y \sim \text{Binomial} \left( 5, \frac{1}{2} \right) \)

\[ P(Y = 0) = \frac{1}{32} \]

\[ P(Y = 1) = \frac{5}{32} \]

\[ P(Y = 2) = \frac{10}{32} \]

\[ P(Y = 3) = \frac{10}{32} \]

\[ P(Y = 4) = \frac{5}{32} \]

\[ P(Y = 5) = \frac{1}{32} \]

These add up to 1

\[ Y \sim \text{Binomial} \left( n, p \right) \quad P(Y = i) = 0 \quad \forall i > n \quad (\text{For every } i \text{ greater than } n) \]

\[ P(Y = 0) = (1 - p)^n \quad 0: \text{x} \text{x} \text{x} \text{x} \ldots \text{x} \]

\[ P(Y = 1) = (1 - p)^{n-1} \cdot p \quad 1: \text{y} \text{x} \text{x} \text{x} \ldots \text{x} \]
$P(Y=i) = p^i(1-p)^{n-i}$

Positive skew: histogram is changed to the left side
Negative skew: histogram is changed to the right side
No skew: symmetrical histogram