

Binomial Probabilities

The Binomial Experiment:

- Experiment consists of n identical trials
- Each trial results in either “success” or “failure”
- Probability of success, p , is constant from trial to trial
- The probability of failure is $1 - p$ and is constant from trial to trial
- Trials are independent
- If X is the total number of successes in n trials of a binomial experiment, then X is a binomial random variable
- For a binomial random variable X , the probability of x successes in n trials is given by the binomial distribution

$$\Pr(X = k) = \binom{n}{k} p^k (1 - p)^{n-k}, \quad k = 1, \dots, n$$

- $n!$ is read as “ n factorial” and $n! = n \times (n - 1) \times \dots \times 2 \times 1$
- $0! = 1$
- In our example, $p = 0.4$ and $n = 3$. So, we need to find

$$\Pr(X = 2) = \binom{3}{2} (0.4)^2 (0.6)^1 = 0.288.$$