Binomial distribution

Binomial Distribution is the likelihood of observing a certain outcome when performing a series of test for which there are only two possible outcomes.

Binomial Distribution Probability

$$P(X) = {}^{n}C_x p^x q^{n-x} = \binom{n}{x} p^x q^{n-x} = \frac{n!}{(n-x)!\,x!} p^x q^{n-x}$$

where

$n =$ the number of trials

$x =$ the number of successes

$n - x =$ the number of failures

$p =$ probability of getting a success in one trial,

$q = 1 - p$ =the probability of getting a failure in one trial

Example. If Stephen Curry's 3-point shooting percentage is 42%, what is the probability that Curry will make 3 out of 5 throws?

$n =$ the number of trials $\rightarrow 5$

$x =$ the number of successes$\rightarrow 3$

$n - x =$ the number of failures$\rightarrow 2$

$p =$ probability of getting a success in one trial, $\rightarrow 0.42$

$q = 1 - p$ =the prob of getting a failure in one trial $\rightarrow 0.58$

$$P(3) = {}^{5}C_3 (0.42)^3 (0.58)^2 = \binom{5}{3} (0.42)^3 (0.58)^2 = \frac{5!}{(2)!\,3!} (0.42)^3 (0.58)^2$$

Binomial distribution

Exercise 1) If you flip a fair coin seven times, what is the probability that you will observe exactly four heads?

Exercise 2) If the probability that a person currently sick with coronavirus has previously had the virus is 0.72, what is the probability that out of a random selection of five currently infected people, at least three have been infected before, correct to four decimal places?

Exercise 3) LeBron James has a 30% chance of making a 3-point shot. Find the probability that out of six attempts LeBron James makes a 3-point shot:

a. four times

b. four times, given that she scores at least one goal.