S12

BINOMIAL DISTRIBUTION

A binomial distribution is a distribution with **identical** independent trials where every trial has exactly two possible outcomes: either success or failure.

The random variable is assigned to the number of successes in a given number of trials.

The probability of $x$successes in n identical independent trials is:

where _____ is the probability of success in an individual trial, and _____ = _____ is the probability of failure in an individual trial.

Note: Each term in the expansion of $(\mathrm{p}+\mathrm{q})^{\mathrm{n}}$ represents the probability of one possible outcome in the probability distribution.

Expectation for a binomial distribution is given by:

Ex. 1: The failure rate is 5% in the initial production run of a new computer chip. A quality control inspector selects 50 chips for testing.

a) What is the probability that more than two of them will be defective?
b) What is the expected number of defective chips?

Ex.2: A family has 6 children. Consider a probability distribution for the number of girls in the family.

a) Identify the discrete random variable.

b) Create a probability distribution table.

c) Verify that the sum of the probabilities is one.

d) Graph the probability distribution.

e) Calculate the expectation and interpret its meaning.

Answer questions in Your Turn on p 166.