Expectation of a Random Variable

The expected value of a random variable is the average of the random variable's outcomes

This is a useful way to summarize the information in the distribution.

Formula for expected value of a random variable X

$$E[X] = \sum_{s \in S} X(s) \, p(s)$$

where $p(s)$ is the probability of the outcome s.

Another way to calculate $E[X]$ is

$$E[X] = \sum_{r \in X(s)} r \cdot p(X = r)$$

where $X(S)$ is the range of the function X.