

# Probability and Statistics Notes

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# 1 Introduction to Probability

## 1.1 The History of Probability

## 1.2 Interpretations of Probability

Probability Interpretations

- Frequency: If an experiment is carried out many times, the frequency with which a particular outcome occurred would define its probability.
- Classical: If an outcome of some experiment must be one of  $n$  different, equally likely outcomes, the probability of each outcome is  $\frac{1}{n}$ .
- Subjective: An entity assigns probabilities to each possible outcome.

Probability theory does not depend on interpretation.

## 1.3 Experiments and Events

Probability allows us to quantify how likely an outcome is to occur.

**Experiments:** Any process in which the possible outcomes can be identified ahead of time.

**Events:** A well defined set of possible outcomes of the experiment.

Although there is controversy in regard to the proper meaning and interpretation of some of the probabilities that are assigned to the outcomes of many experiments, once these probabilities are assigned, there is complete agreement upon the mathematical theory of probability.

Almost all work in the mathematical theory of probability is related to:

- Methods for determining probabilities of certain events from given probabilities for each possible outcome in an experiment.
- Methods for revising probabilities of events when additional relevant information is obtained.

## 1.4 Set Theory