1 Discrete Probability

An experiment is a procedure that yields one of a given set of possible outcomes. The sample space of the experiment is the set of possible outcomes. An event is a subset of the sample space. Laplace's definition of the probability of an event with finitely many possible outcomes will now be stated.

Definition

If S is a finite nonempty sample space of equally likely outcomes, and E is an event, that is, a subset of S, then the probability of E is $p(E) = \frac{|E|}{|S|}$.

The probability of an event can never be negative or more than one!

We can use counting techniques to find the probability of events derived from other events.

Theorem 1.1

Let E be an event in a sample space of S. The probability of the event $\overline{E} = S - E$, the complementary event of E, is given by

 $p(\overline{E}) = 1 - p(E)$

We can also find the probability of the union of two events.

Theorem 1.2

Let E_1 and E_2 be events in the sample space S. Then

 $p(E_1 \cup E_2) = p(E_1) + p(E_2) - p(E_1 \cap E_2)$