Math 55 Lecture 16 §7.2, 7.3

Last time we informally defined
probability of event =

More formally:

Def: If S is a finite sample space of equally likely outcomes and E is an event, ie a subset of S, then the probability

But what if

Def: Let S be sample space of an experiment w/ a finite or countable number of outcomes. A probability distribution p is

Call $p(s)$ the

Def: Let S be set w/ n elements. The uniform distribution

Def: If $E \subset S$ is an event, the probability of E is

Theorem: (1) $p(\overline{E}) =$

(2) $p(E_1 \cup E_2) =$

(3) If $E_1, E_2, \dots$ is a sequence of pairwise disjoint events in sample space S, then $p(\bigcup_i E_i) =$

Conditional Probability

Suppose we flip a fair coin 3 times.

Let F be event that

Let E be event that

Suppose we know that F occurs. Given this knowledge, what is

Sol: The only possible outcomes are:

To find conditional prob. of E given F, use

Def: Let E and F be events w/ $p(F) > 0$. The **conditional probability** of E given F, denoted $p(E|F)$, is defined as

Ex: What is the conditional probability

Sol: Let E = event that

Let F = event that

Independence: Suppose a coin is flipped 3 times. Does knowing that the first flip is tails (F) alter the probability that

Note:

Def: The events E and F are independent iff

Ex: Assume that each of the 4 ways a family can have 2 kids

Bernoulli trials

Def: Suppose an experiment has 2 possible outcomes (eg coin flip). Each performance of such an experiment called a

Ex: Have biased coin s.t.

Sol:

Theorem: The prob. of exactly k successes in n indep Bernoulli trials, w/ prob. p of success & prob $q = 1-p$ of failure, is

§7.3 Bayes' Theorem

Ex: Have two boxes B_1, B_2.

<u>Sol:</u> Let E be event that

Bayes' Theorem: Suppose that E and F are events from a sample space S s.t. $p(E) \neq 0$ and $p(F) \neq 0$. Then

$$p(F|E) =$$

Ex:

Sol: