Math 55 Lecture 15 § 7.1

Ex: How many solutions are there to the eqn

Introduction to probability

Ex: What is prob. that die comes up as a multiple of

Successful outcomes =

Possible outcomes =

$\therefore$ the prob. is

This definition makes sense if we are considering experiments w/

Def: An experiment is a procedure that

The sample space of the experiment

An event is

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

Ex: What is prob. that when two dice are rolled, the sum of numbers on the two dice is

Sol:

Ex: In lottery, a list of 4 digits (not necess distinct) is randomly constructed. A player wins \$10 000 if he/she

Sol: Size of sample space ?

Size of event that player wins ?

Ex: In same lottery, player wins \$100 if exactly 3 digits are matched — ie.

Sol: Size of Sample space:

Size of event that exactly 3 digits match?

Poker is card game in which each player gets a 5-card hand. The cards come from deck of 52 cards; there are 13 different kinds of cards (2, 3, .., 10, J, Q, K, A) and 4 cards of each kind, one of each suit (spades, clubs, hearts, diamonds).

Ex: What is the prob. that a poker hand contains a

Sol:

Theorem: Let E be an event in a sample space S. The prob of the event $\overline{E}$, the complementary event of E (i.e. the event that E does not happen) is $p(\overline{E}) =$

Theorem: Let E_1 and E_2 be events in the sample space S. Then $p(E_1 \cup E_2) =$

Pf:

Ex: What is prob that pos. integer chosen at random from $\{1, 2, \ldots, 100\}$ is divisible by either

Monty Hall Problem

You are a game show contestant. You're asked to select one of 3 doors to open.
A prize is behind one of the doors, while the other 2 have nothing behind them.
Once you choose a door, the host (who knows what is behind all doors), will choose a losing door & open it. She then asks you if you would like to switch doors.
What should you do? Switch or stay? Does it matter?

(Extra)

Recall: if E is an event, i.e. $E \subset S$, then we defined $p(E) =$, provided that all outcomes in S are equally likely.

What if not all outcomes equally likely?

Def: Let S be sample space of an experiment w/ a finite or countable number of outcomes. A probability distribution p is a function $p: S \to \mathbb{R}$ s.t.

(i)

(ii)

Call $p(s)$ the

To model an experiment, the probability $p(s)$ assigned to an outcome s should equal the limit of: