Ex: How many solutions are there to the eqn

Introduction to probability

Ex: What is prob. that die comes up as a multiple of 6

Successful outcomes = 3
Possible outcomes = 6
So the prob. is $\frac{1}{2}$.
This definition makes sense if we are considering experiment 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, the probability of $E$ is

Ex: What is $p(E)$ that when two dice are rolled, the sum of numbers on the two dice is 10?

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

Sol: Size of sample space?

Size of event that player wins?

Ex: In same lottery, player wins $100 if exactly 3 digits are matched – i.e.

Sol: Size of sample space?

Size of event that exactly 3 digits match?
Poker is a card game in which each player gets a 5-card hand. The cards come from a 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 $\rho(\overline{E}) =$
Theorem: Let $E_1$ and $E_2$ be events in the sample space $S$. Then $p(E_1 \cup E_2) =$

Proof:

Example: 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. $E \subseteq S$, then we defined $p(E) = \frac{1}{|S|}$, 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 $p: S \rightarrow \mathbb{R}$ s.t.:

1. $\sum_{s \in S} p(s) = 1$
2. $p(s) \geq 0$ for all $s \in S$

Call $p(s)$ the

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