

Recitation Guide - Week 5

Topics Covered: Strong Induction, Intro to Probability

Problem 1:

A standard 52-card deck consists of cards labelled 2 through 10, an Ace, Jack, Queen and King, each with four suits. A hand consists of five cards drawn from the deck. Max is a wannabe magician who is trying to draw specific hands for his new magic show: The Appearing Pigeon. However, Max can't quite consistently draw a specific hand, but he has learned how to draw any hand uniformly at random from the Val school of magic.

- (a) Calculate the probability that he draws a four of a kind successfully. A hand is considered "four of a kind" if it contains all four suits of a specific label.
- (b) Calculate the probability that he draws a full house successfully. A hand is considered "full house" if it contains three cards of the same label and two cards of the some other label (i.e. 3 Aces and 2 8s).

Problem 2:

Prove for an arbitrary positive integer a that for all positive integers n that $a^n - 1$ is divisible by $a - 1$.

Problem 3: Compute the probability of the event “when we roll n (distinguishable) fair dice, any k of the dice show a 4 while the other $n - k$ do not show a 4”. Assume $0 \leq k \leq n$.