

In-Class Problems — Week 9, Wed

Problem 1. We have just demonstrated how to “guess” the 5th card in a poker hand when a collaborator reveals the other 4 cards. Describe a method for guessing 2 hidden cards in a hand of 9 cards when your collaborator reveals the other 7 cards.

Problem 2.

(a) Prove the following corollary to Hall’s Marriage Theorem.

Corollary 2.1. *Let $G = (V_1, V_2, E)$ be a bipartite graph where $|V_1| \leq |V_2|$. Suppose that a positive integer k exists such that each node in V_1 is adjacent to at least k vertices in V_2 and each node in V_2 is adjacent to at most k vertices in V_1 . Then, G contains a perfect matching on the vertices in V_1 .*

(b) Use part (a) to determine the largest-size deck for which the trick of reading 4 cards from a 5-card hand remains possible. (You must not only determine an upper bound, you must prove the bound is achievable.)