

CS207 (Discrete Structures)

Exercise problem set 9

– Perfect matchings, vertex covers and Stable matchings

October 15, 2015

Solve the following questions from Douglas West's book, *Introduction to Graph Theory, 2nd Edition*.

1. Perfect matchings and vertex covers: Exercises 3.1.26, 3.1.28, 3.1.29, 3.1.31
2. Stable matchings: Exercises 3.2.3, 3.2.4, 3.2.11, 3.2.12
3. Slightly harder question/reading assignment: Recall that Dilworth's theorem states: if the largest anti-chain in a finite poset is of length r , then the poset can be partitioned into r chains. In other words, in any finite poset, the maximum number of elements in any antichain equals the minimum number of chains in any partition of the set into chains.
 - (a) Provide an alternate proof of Hall's theorem using Dilworth's theorem
 - (b) Prove Dilworth's theorem using the Konig-Egervary theorem.

In class, we proved that Hall's theorem implies Konig-Egervary theorem. Hence, we can now conclude that these three results are equivalent.