

CS105L: Discrete Structures  
I semester, 2006-07

Tutorial Sheet 11: Graph Theory: Matchings

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November 2, 2006

1. If  $|N(S)| \geq |S| - d$  for every set  $S \subset A$  of a bipartite graph  $G = ((A, B), E)$  for some fixed natural number  $d$ , show that  $G$  contains a matching of cardinality  $|A| - d$ .
2. Show that every regular graph of non-zero even degree has a 2-factor.  
(**Hint.** Split each vertex into 2 and try to find a perfect matching.)
3. Show that every bridgeless 3-regular graph has a 1-factor.