Introduction to Discrete Mathematics Ma/CS 6a Fall 2005-06 **Homework 6**

Due: Monday November 7th, 1pm.

1) 8.5.10

2) For each of the following statements decide if it is true or false, and either prove it or give a counterexample:

(i) If G is connected and has no path with more than k edges, then any two paths in G each having k edges must meet.

(ii) If u, v, w are vertices of G and there is a cycle of G visiting u and v and a cycle of G visiting v and w then there is a cycle of G visiting u and w.

(iii) If e, f, g are edges of G and there is a cycle of G containing e and f and a cycle of G containing f and g then there is a cycle of G containing e and g.

3) Let T be a tree and let $T_1, T_2, \cdots, T_k$ be subtrees of T, every two of which have a vertex in common. Show that some vertex of T belongs to all of the subtrees $T_1, \cdots, T_k$.

4) 9.2.8

5) Suppose $G = (A, B)$ is a bipartite graph with $|A| = |B| = m$ and there is some number d so that for every $S \subset A$ we have $|N(S)| \geq |S| - d$ (i.e. there are at least $|S| - d$ points in B with some neighbour in S). Show that G contains a matching with $m - d$ edges.