

## HOMEWORK SET #10 / CO1A / Spring 2009

1. A bipartite graph is complete if it contains all the edges from one part of the vertices to the other one. Which trees are complete bipartite graphs.
2. Prove that any acyclic subgraph of a connected graph can be completed into a spanning tree (i.e. a spanning graph which is a tree) of the graph.
3. Show that a graph  $G$  is a tree if and only if it is cycle-free, however, adding any edge to  $G$  will create a cycle.
4. Let  $n > 1$  be a positive integer. Prove that  $R(n + 2, 3) > 3n$ .
5. A social worker has to make altogether 43 visits, at least one on each day. Is there a period of consecutive days on which he makes exactly 21 visits if he makes his visits on 22 days.
6. Same as problem #5, with 23 days, i.e., assume a social worker has to make altogether 43 visits, at least one on each day. Is there a period of consecutive days on which he makes exactly 21 visits if he makes his visits on 23 days?
7. Suppose you will get 46 homework sets in the following 30 days, out of which you will have to do at least one every day and — of course — all during the 30 days. Show that there must be a period of consecutive days during which you would do exactly 10 homework sets!
8. A social worker has 77 days to make his visits. He wants to make at least one visit a day, and has 133 visits to make. Is there a period of consecutive days in which he makes 21 visits? Why?

## HOMEWORK SET #10 / CO1A / Fall 2008

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