

## Problem Set 5

Please turn in each problem on a separate page with your name.

1. In a directed graph, the *indegree* of a node is the number of incoming edges and the *out-degree* is the number of outgoing edges. Show that the following problem is NP-complete. Given an undirected graph  $G$  and a designated subset  $C$  of  $G$ 's nodes, is it possible to convert  $G$  to a directed graph by assigning directions to each of its edges so that every node in  $C$  has indegree 0 or outdegree 0, and every other node in  $G$  has outdegree at least 1.
2. Book, 7.30 . [*minesweeper* is NP-complete]
3. Book, 7.41 . [Minimizing NFAs is hard]
4. Book, 8.9 . [ $LADDER_{DFA} \in PSPACE$ ]
5. Book, 8.13 . [ $A_{LBA}$  is PSPACE-complete]
6. Book, 7.45 . [difference hierarchy]
- 7\* Book, 7.49 . [Show that *resolution* is sound and complete]