Homework Assignment #8
Due: May 19, 4:00 p.m.

1. Consider directed graphs on n nodes, labelled $1, 2, 3, \ldots, n$. Such a graph is called *sparse* if the number of edges is much smaller than n^2. Such a graph can be compactly represented as an (unsorted) list of its edges. Each element in this list is a pair (i, j), indicating that there is an edge from node i to node j.

Given the list representation of two directed graphs on n nodes, each containing at most m edges, give a randomized algorithm to determine whether the first is a subgraph of the second. The expected running time of your algorithm should be $O(m)$, and the amount of space used should be $O(m)$ in the worst case.

You may assume that you are given a prime number $p \geq n^2$.