Analysis of Algorithms: Assignment 6

Due date: October 28 (Thursday)

Problem 1 (3 points)
Write a *nonrecursive* version of FIND-SET with path compression, for disjoint-set forests.

Problem 2 (4 points)
Write efficient algorithms for converting (a) an adjacency-list representation of a graph into an adjacency matrix and (b) an adjacency matrix into adjacency lists. Give the time complexity of your algorithms.

Problem 3 (3 points)
Using Figure 23.3 in the textbook as a model, illustrate the steps of breadth-first search on the directed graph of Figure 23.2(a), with vertex 3 as the source.

Problem 4 (bonus)
This problem is optional, and it allows you to get 2 bonus points toward your final grade for the course. You cannot submit this bonus problem after the deadline.

Suppose that you have a large file of English words; for convenience, assume that all letters in the file are lower-case. One of the words occurs once in the file, and all other words occur twice. Describe an efficient procedure for identifying the word that occurs once. Your procedure must run in *linear* time and use *constant* amount of memory. For example, suppose that the file includes the following nine words:

```
hour   day   week
week   year  hour
month  day   month
```

Then, the procedure must return the word `year`.