Algorithm HW10

1. Exercises 23.1-11

Given a graph *G* and a minimum spanning tree *T*, suppose that we decrease the weight of one of the edges not in *T*. Give an algorithm for finding the minimum spanning tree in the modified graph.

2. Exercises 23.2-4

Suppose that all edge weights in a graph are integers in the range from 1 to |V|. How fast can you make Kruskal's algorithm run? What if the edge weights are integers in the range from 1 to W for some constant W?

3. Exercises 23.2-5

Suppose that all edge weights in a graph are integers in the range from 1 to $|V|$. How fast can you make Prim's algorithm run? What if the edge weights are integers in the range from 1 to *W* for some constant *W*?

4. 課本 Problem 23-1 Second-best minimum spanning tree

5. 課本 Problem 16-4 Scheduling variations

6. For a set of variables $x_1, x_2, \ldots, x_n$, you are given some equality constraints, of the form "$x_i = x_j$" and some disequality constraints, of the form "$x_i \neq x_j$". Is it possible to satisfy all of them? For instance, the constraints :

$x_1 = x_2,; x_2 = x_3; x_3 = x_4; x_1 \neq x_4;$

cannot be satisfied. Give an efficient algorithm that takes as input *m* constraints over *n* variables and decides whether the constraints can be satisfied. Describe the data structure used by your algorithm, and analysis the time complexity of your algorithm.