Problem Solving

Homework #5

Due: May-22 (Wed.) (before 03:00pm)

Instruction:

a. You have 1 problem in this homework.

b. Submit your report at the class on May-22.

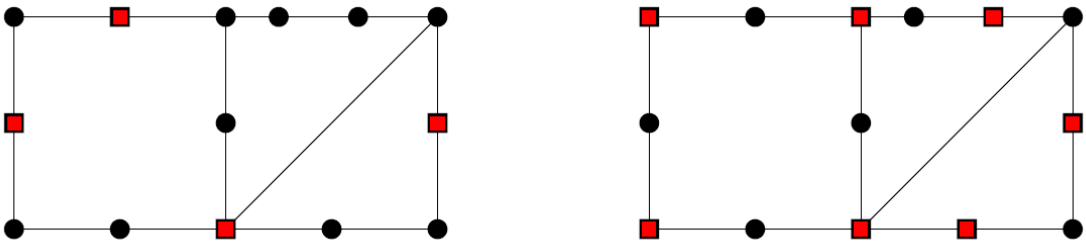
c. Any work that you turn in should be your own.

d. Any late submission will not be accepted.

Problem #1. Checkpoints (10 pts)

The police department plans to set up some checkpoints at road intersections for the crackdown on drunk drivers. The locations of checkpoints should be determined so that it is not possible for drunk drivers to avoid checkpoints. We assume that a checkpoint at an intersection can watch every road segment adjacent to the intersection.

In the following illustration, some intersections cannot be watched in the left figure while all the intersections are covered in the right figure. Note that boxes and circles represent intersections with and without checkpoint, respectively. A road segment is an edge between intersections.



Given a road network described by intersections and connection among them, design an algorithm to find minimal number of checkpoints that can watch all the road segments. Give your time complexity analysis to compute such locations.