1. Problem 26-1, parts a & b, page 692.
Note: For part b, assume that you are using the Edmonds-Karp algorithm for maximum flow.

2. Problem 26-4, parts a & b, page 694.
Note: Do justify the running time of your algorithm.

3. Network Flow: International Relief.
You are coordinating an international relief effort to clean up after a disaster. You have a list of m tasks $t_1, \ldots, t_m$. Task t_i must be performed k_i times. There are n organizations willing to help with the tasks. By prior agreement, you may ask each organization to perform 2 *different* tasks. However, not all organizations can perform every task. For organization j, $C_j \subseteq \{t_1, \ldots, t_m\}$ is the set of tasks the organization can perform.

a. Explain how to transform the problem into a network flow problem such that the maximum flow can be used to determine whether it is possible to assign tasks to organizations such that each task t_i is performed k_i times. Argue that your transformation works.

b. It turns out that each organization represents one of r nationalities. In order promote an image of international cooperation, you are asked to assign the tasks in such a way that each task is performed by organizations from more than one nation. (E.g., if "checking for gas leaks" must be performed 10 times, you should not assign all 10 to organizations that all turn out to be French. Assigning 9 to French organizations and 1 to an Italian organization would be fine.)

Explain how to transform this version of the problem into a network flow problem. You may assume that for each i, $k_i \geq 2$. Argue that your transformation works.