

**26.1-6**

Professor Adam has two children who, unfortunately, dislike each other. The problem is so severe that not only do they refuse to walk to school together, but in fact each one refuses to walk on any block that the other child has stepped on that day. The children have no problem with their paths crossing at a corner. Fortunately both the professor's house and the school are on corners, but beyond that he is not sure if it is going to be possible to send both of his children to the same school. The professor has a map of his town. Show how to formulate the problem of determining whether both his children can go to the same school as a maximum-flow problem.

**26.1-7**

Suppose that, in addition to edge capacities, a flow network has *vertex capacities*. That is each vertex  $v$  has a limit  $l(v)$  on how much flow can pass through  $v$ . Show how to transform a flow network  $G = (V, E)$  with vertex capacities into an equivalent flow network  $G' = (V', E')$  without vertex capacities, such that a maximum flow in  $G'$  has the same value as a maximum flow in  $G$ . How many vertices and edges does  $G'$  have?

**26.2-11**

The *edge connectivity* of an undirected graph is the minimum number  $k$  of edges that must be removed to disconnect the graph. For example, the edge connectivity of a tree is 1, and the edge connectivity of a cyclic chain of vertices is 2. Show how to determine the edge connectivity of an undirected graph  $G = (V, E)$  by running a maximum-flow algorithm on at most  $|V|$  flow networks, each having  $O(V)$  vertices and  $O(E)$  edges.