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COMP9101 Ass04

1. There are N computers in a network, labelled $\{1, 2, 3, \ldots, N\}$. There are M one-directional links which connect pairs of computers. Computer 1 is trying to send a virus to computer N. This can happen as long as there is a path of links from computer 1 to computer N. To prevent this, you've decided to remove some of the links from the network so that the two computers are no longer connected. For each link, you've calculated the cost of removing it. What is the minimum total cost to disconnect the computers as required, and which edges should be removed to achieve this minimum cost? (25 pts)

Q1.

We can solve this kind of problem with the idea of maximum flow problem. The minimum cost to disconnect the necessary computer is equivalent to calculate the min cut for this graph. For current graph, the source is the computer 1, the target computer is the computer N, each edge capacity is the cost of removing each edge. By using the maximum flow algorithm, We can calculate the min cut to get the minimum cost to cut the connection between computer 1 and N.
The number of vertex is V, therefore the time complexity of this algorithm is O(V^3).