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Homework 5 – Q3

Construct a flow network as a directed graph where the computers are the vertices of the graph and each edge is represented by two directed edges of opposite orientation and each of capacity equals to the cost of removing the corresponding link. In this case, the computer 1 will play the role of the source and the computer N will play the role of the sink.

Now, we run the Edmonds-Karp algorithm to find the maximal flow through such a network. The complexity of the Edmonds-Karp algorithm is $O(|V||E|^2)$, where |V| is the total number of vertices and |E| is the total number of edges. After the algorithm has converged, we construct the last residual network flow and look at all the vertices to which there is a path from the source. This will define a minimal cut, so we look at all the edges crossing such a minimal cut. The sum of the capacity of such edges in the forward direction is the minimum cost needed to disconnect the computers as required. And these edges are the edges that should be removed to achieve the minimum cost.