Due Date: October 14, 11:59pm

In all problems, prove the correctness of your algorithm and analyze its running time.

Problem 1: [10pts] Let $G = (V, E)$ be a flow network, and $s, t \in V$ be the source and sink. Every edge in E has a capacity of 1. Given a parameter $k \in \mathbb{Z}$, describe an algorithm to identify k edges in G such that after deleting the k edges, the value of the maximum (s, t)-flow in the remaining graph is as small as possible. (**Hint:** *Use the max-flow min-cut theorem.*)

Problem 2: [10pts] Let $G = (V, E)$ be a flow network, and $s, t \in V$ be the source and sink. Every edge has an integer capacity. Give an algorithm to find a minimum (s, t)-cut (S, T) with the smallest number of edges crossing from S to T. (**Hint:** *Modify the capacities.*)