Exercise of Algorithms

Problem 1

The Multiway Cut Problem is defined as follows: "given an undirected graph $G = (V, E)$ and a set of *terminal nodes* s_1, $s_2, \cdots, s_k \in V$, find a minimum set of edges in E whose removal will make the k terminal nodes be mutually disconnected. (That is, if we remove that set of edges from the graph, every two terminal nodes will be disconnected from each other.)" It is known that when $k = 2$, the problem can be solved in polynomial time.

Your task: *Prove that when $k = 3$, the problem has a polynomial-time 2-approximation algorithm.* (Hint: use "It is known that when $k = 2$, the problem can be solved in polynomial time." as known knowledge.)