Homework 5 Optional Problems

> *Consider an undirected graph $G = (V, E)$ with nonnegative edge costs. You are given a set $T \subseteq V$ of k vertices called terminals. A Steiner tree is a subset $F \subseteq E$ of edges that contains a path between each pair of terminals. For example, if $T = V$, then the Steiner trees are the same as the connected subgraphs. It is a fact that the decision version of the Steiner tree problem is NP-complete. Give a dynamic programming algorithm for this problem (i.e., for computing a Steiner tree with the fewest number of edges) that has running time of the form $O(c^k \cdot poly(n))$, where c is a constant (like 4) and poly is some polynomial function.*

ANSWER: Dreyfus-Wagner's algorithm can compute a Steiner tree in $O(3^k n^2)$ time. See this paper.