

Exercise sheet 8b
COMP6741: Parameterized and Exact Computation

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19T3

Exercise 1. Show that the algorithm solving COMP-FVS from the lecture notes has running time $O^*(4^k)$.

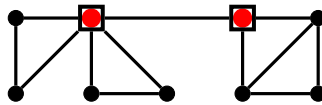
Exercise 2. Recall that a *cluster graph* is a graph where every connected component is a complete graph.

CLUSTER VERTEX DELETION

Input: Graph $G = (V, E)$, integer k

Parameter: k

Question: Is there a set of vertices $S \subseteq V$ with $|S| \leq k$ such that $G - S$ is a cluster graph?



Recall that G is a cluster graph iff G contains no induced P_3 .

- Design an $O^*(2^k)$ time algorithm for CLUSTER VERTEX DELETION.

Hints. (1) Show that the disjoint version of the problem can be solved in polynomial time: given $(G = (V, E), S, k)$ such that $|S| = k + 1$ and $G - S$ is a cluster graph, find a $S^* \subseteq V \setminus S$ with $|S^*| \leq k$ such that $G - S^*$ is a cluster graph.
(2) Simplification rule for $v \in V \setminus S$ inducing a P_3 with 2 vertices in S . Reduce to maximum weight matching.