Parameterized Algorithms Tutorial

Tutorial Exercise T1

Provide an FPT-reduction from Independent Set to Short Turing Machine Acceptance (STMA).

Tutorial Exercise T2

Provide an FPT-reduction from Dominating Set to Short Multi-Tape Turing Machine Acceptance.

Tutorial Exercise T3

Consider the following variant of Vertex Cover:

Half Partial Vertex Cover

Input: A graph $G = (V, E)$, an integer k.
Parameter: The integer k.
Question: Can k vertices in G cover at least $|E|/2$ edges?

Show that Half Partial Vertex Cover is in $W[1]$ by reducing it to STMA.

Homework H1

Consider the following variant of Hitting Set:

Half 3-Hitting Set

Input: A finite universe U, a family $\mathcal{F} \subseteq 2^U$ of sets of size exactly three, an integer k.
Parameter: The integer k.
Question: Can k elements of U hit at least $|\mathcal{F}|/2$ sets?

Show that Half 3-Hitting Set is in $W[1]$.