

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

Show that:

1. HITTING SET \leq_{FPT} DOMINATING SET.
2. DOMINATING SET \leq_{FPT} HITTING SET.

Homework H2

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 $W[1]$.