Theorem 7

Let G be a synchronous circuit, let c be an arbitrary positive real number, and let r be a function $r : V \mapsto \mathbb{Z}$.

Then, r is a legal retiming of G such that $\Phi(G_r) \leq c$ if and only if

1. $r(u) - r(v) \leq w(e) \quad \forall\ u \xrightarrow{e} v \in G$
2. $r(u) - r(v) \leq W(u, v) - 1 \quad \forall u, v \in V : D(u, v) > c$

Theorem 7

Problem LP

Let S be a set of m linear inequalities of the form

$$x_j - x_i \leq a_{ij}$$

on the unknowns $x_1, x_2, \ldots, x_n$, where a_{ij} are given real constants.

Any such system can be satisfied — or determined to be inconsistent — in $\mathcal{O}(mn)$ time by the Bellman-Ford algorithm.