

# Algorithm CP

Compute the clock period  $\Phi(G)$  for a synchronous circuit  $G$ .

1. Let  $G_0$  be the (acyclic) subgraph of  $G$  that contains precisely those edges  $e : w(e) = 0$ .
2. Perform a topological sort on  $G_0$ .
3. Go through the vertices in the topological order. For each vertex  $v$ 
  - A. if there is no incoming edge to  $v$ , set  $\Delta(v) \leftarrow d(v)$ ;
  - B. otherwise, set  $\Delta(v) \leftarrow d(v) + \max\{\Delta(u) : u \xrightarrow{e} v \text{ and } w(e) = 0\}$ .
4.  $\Phi(G) = \max\{\Delta(v)\}$ .

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## Complexity

- Time complexity:  $\mathcal{O}(E)$ .
  - Actually, topological sort is  $\mathcal{O}(V + E)$ .
- Space complexity:  $\mathcal{O}(V + E)$ .