

# Algorithm CP

## Complexity

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

# Algorithm WD

Compute matrices  $W$  and  $D$  of a synchronous circuit  $G$ .

1. Weight each edge  $u \xrightarrow{e} v \in E$  with  $(w(e), -d(u))$ .
2. Compute the weight of the shortest path joining each connected pair of vertices by solving an all-pairs shortest-paths algorithm — e.g., Floyd-Warshall algorithm.
3. For each shortest-path weight  $(x, y)$  between two vertices  $u$  and  $v$ , set

$$W(u, v) \leftarrow x$$

$$D(u, v) \leftarrow d(v) - y$$