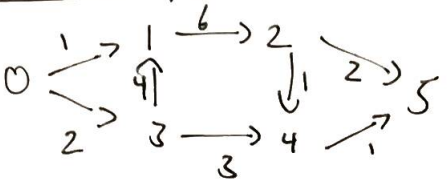
CS61B Dynamic Programming

Graph Warmup:



What is the shortest paths tree?

In what order does Dijkstra's visit the vertices?

0, 1, 3, 4, 5, 2

Topological sort/ordering:

0, 3, 1, 2, 4, 5

Dijkstra's:

~~0, 0, 0~~

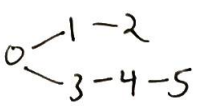
~~1, 1, 0~~

~~3, 2, 0~~

~~2, 7, 1~~

~~4, 5, 3~~

~~5, 6, 4~~



DAG = directed acyclic graph (can always be topologically sorted). → linearization.

Finding shortest path is easiest in DAGs.

DAG shortest paths:

- Visit vertices in topological order.
  - When we visit a vertex, relax all of its going edges.

Runtime:

$\Theta(E+V)$

Step 1: topological sort = $\Theta(E+V)$

Step 2: Initialize arrays: $\Theta(V)$

Step 3: Relaxing: $\Theta(E)$