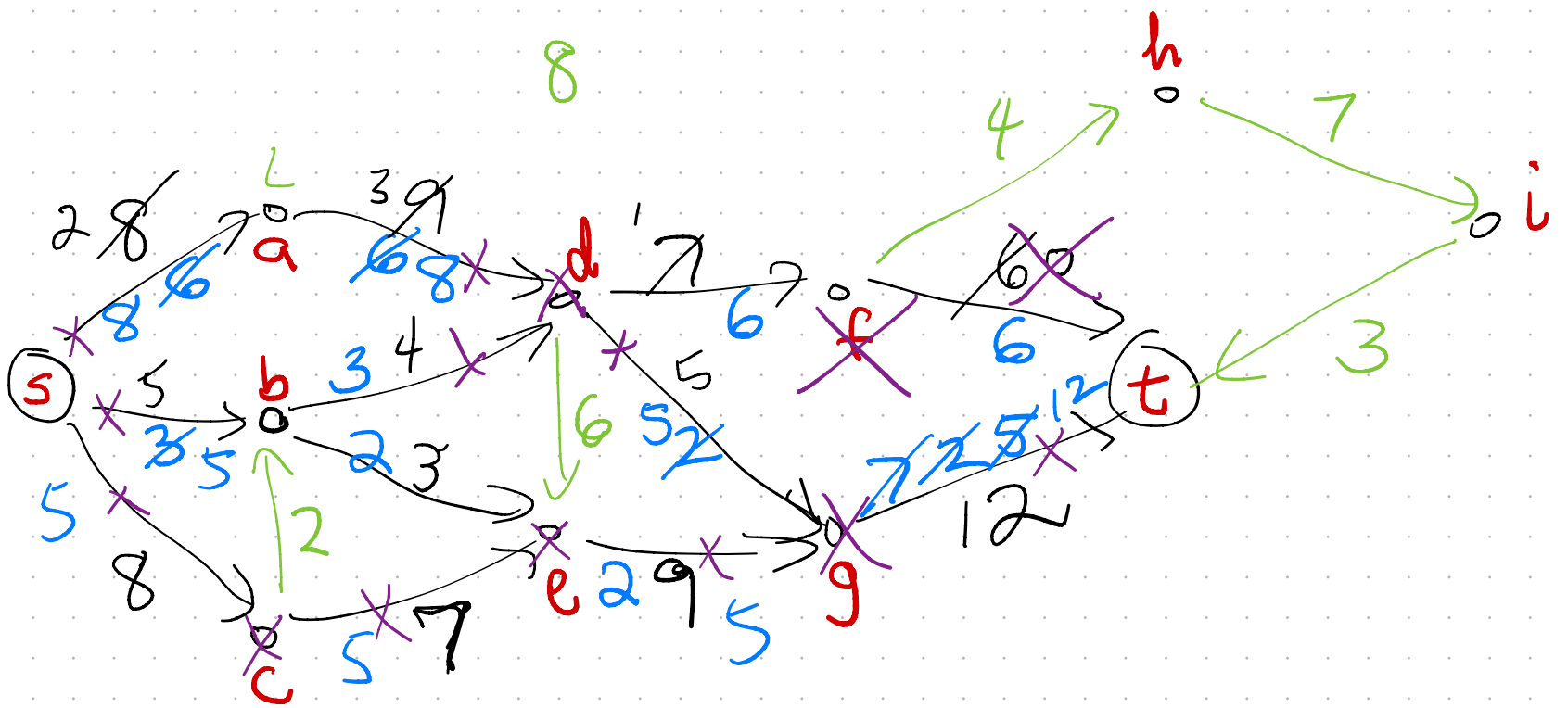


17 Oct 2025

Finishing Dinitz +
Max-Flow Applications

Announcements.

- Prelim 1 graded. Regrades open thru end of next Fri.
- ② Problem Set 3 to be released this weekend,
due Fri 10/31.



Time complexity

BFS to find advancing edges:
 $O(m)$.

Stack-based phase of algorithm.

3 types of operations

- stack push
- stack pop (+ vertex/edge deletions)

- updating flow on augmenting path.

← happens $\leq m$ times

performs $O(n)$ work each time.

vertex/edge deletions cost

$O(1)$ per vertex or edge.

Stack pops amortized against augmenting paths and

deletions. In total all these

ops cost $O(mn)$.

Every time a vertex v is pushed

onto the stack it either

leads to discovering an aug

path (amortize $\text{push}(v)$ against

augmenting that path) or

deleting v (amortize $\text{push}(v)$

against deletion).

Blocking flow takes $O(mn)$ time
to compute.

Dinitz does n of these ...

$O(mn^2)$ running time
in total.