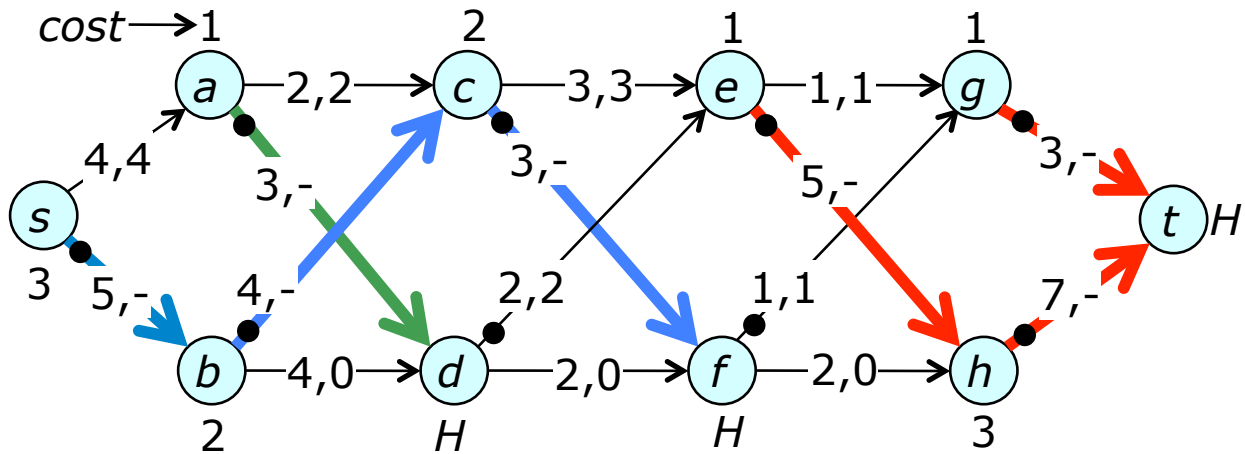1. (5 points). The diagram below shows an intermediate state in the execution of Dinic's algorithm with dynamic trees.

What edges are added to the dynamic trees data structure during the next augmenting path search?

What augmenting path is chosen next?

For each edge in the augmenting path, list the amount of flow on the edge, after flow is added to the augmenting path.

2. (5 points) Let x be a node in a self-adjusting search tree with root r. Suppose x has 5 descendants, r has 1200 and $depth(x)=100$. What are the values of $rank(x)$ and $rank(r)$?

Give an upper bound on the number of credits needed to perform a *splay* at x, while maintaining the validity of the credit invariant.

How many splay steps are performed during the splay operation?

For some of these splay steps, $rank(x)=rank(p(p(x)))$. Give a lower bound on the number of splay steps for which this is true.