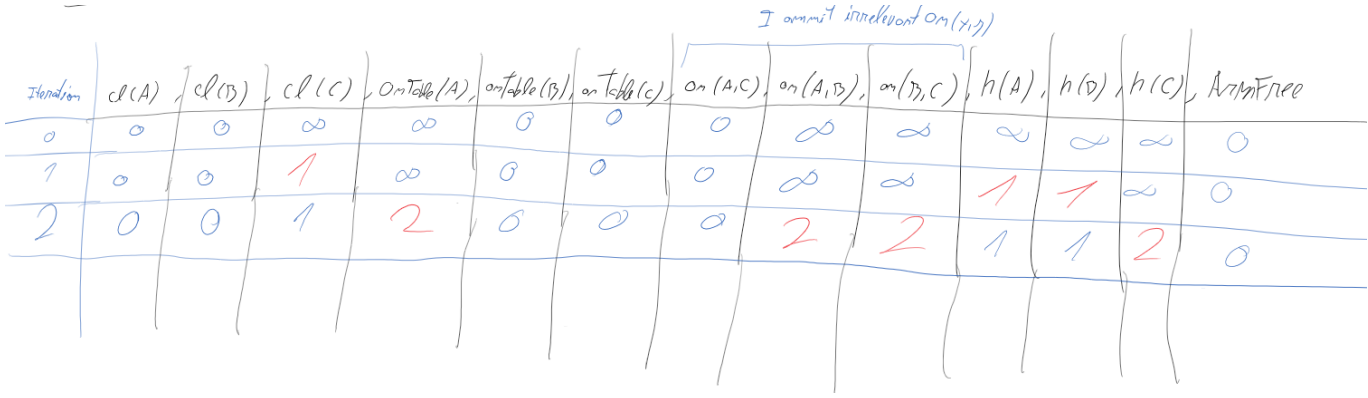
AI Planning for Autonomy

Solution Problem Set VI: Relaxed Plan Heuristic and Iterated Width

1. Derive best supporters function from the last row of the h^{max} table.



The table for h^{add} changes only the value for $on(B, C)$ to 3.

$h_{ff} = 4$ for both cases. Even if $h_{add}(s_0, G) \neq h_{max}(s_0, G)$, the best supporter bs function doesn't change.

$bs(on(A, B)) = Stack(A, B) \rightarrow$ need to support precs: $holding(A)$. Supported by initial state: $clear(B)$

$bs(on(B, C)) = Stack(B, C) \rightarrow$ need to support precs: $holding(A)$ and $clear(C)$

$bs(holding(A)) = Unstack(A, C) \rightarrow$ all precs supported by initial state

$bs(holding(B)) = Pickup(B) \rightarrow$ all precs supported by initial state

$bs(clear(C)) = Unstack(A, C) \rightarrow$ all precs supported by initial state.

Relaxed Plan is = { Unstack(A,C), Pick(B), stack(A,B), stack(B,C) }.

Note that even if $Unstack(A, C)$ appears twice as a selected best supporter, it is only considered once in the relaxed plan. Each time the relaxed plan $RelPlan$ is extended by the set union operator $RelPlan = RelPlan \cup bs(g)$, and this operation over sets does not create duplicates by definition.

2.

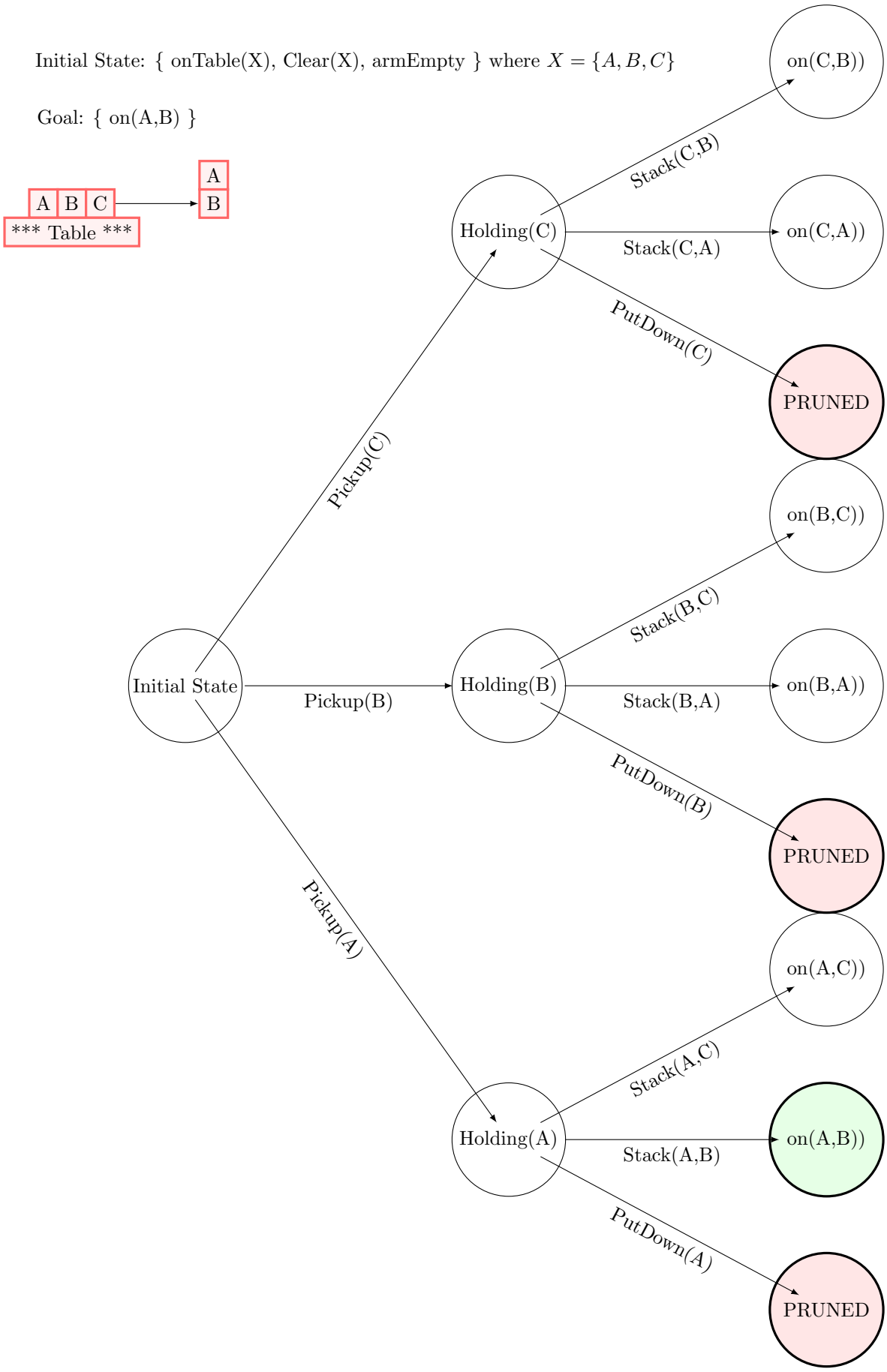


Figure 1: IW tree for question 2.a) Each node shows the atomic fluents that state makes true for the first time. States that do not add a new atom for the first time are pruned. A table can be induced from this tree

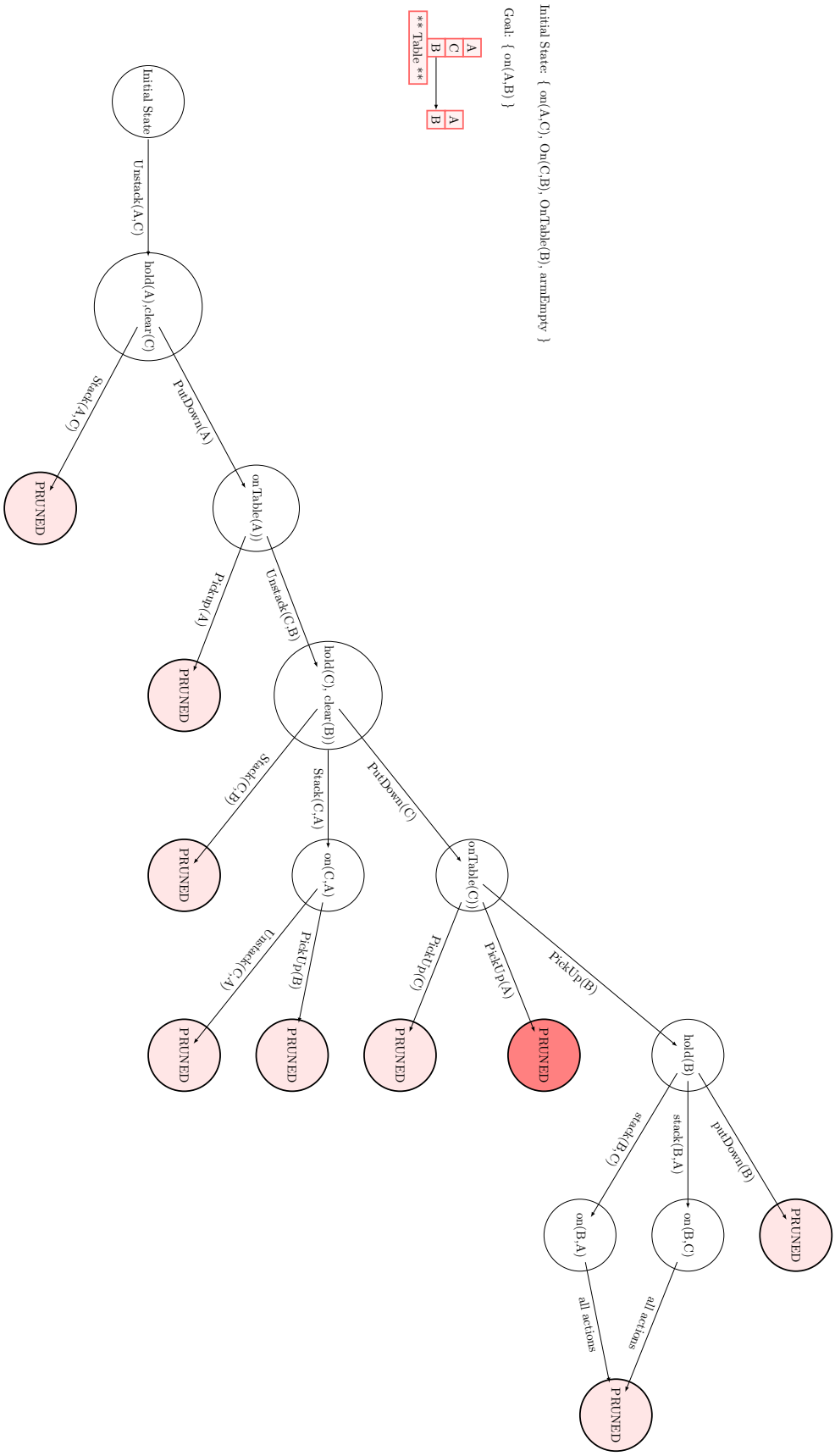


Figure 2: IW tree for question 2.b) Note that the pruned state with darker red is the node that was leading to the goal but was pruned because all its atomic fluents have been seen before. IW(2) would have continued that branch.