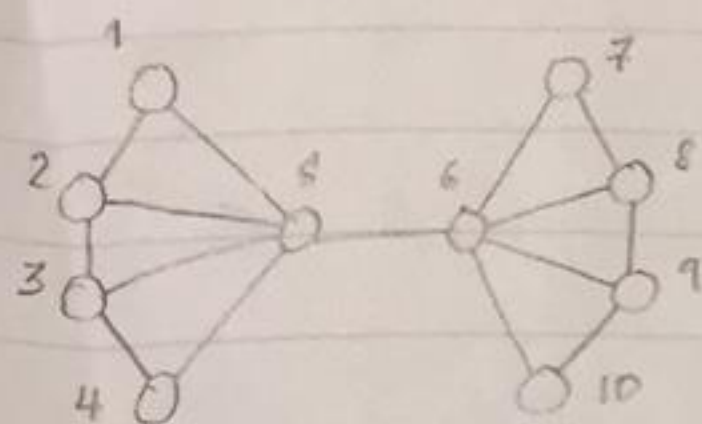


Problem 1



This is improved by both MRV and LCV heuristics.

Tracing

- $\{ \}$
- $\{ 1:R \}$
- $\{ 1:R, 2:B \}$
- $\{ 1:R, 2:B, 5:G \}$
- $\{ 1:R, 2:B, 5:G, 3:R \}$
- $\{ 1:R, 2:B, 5:G, 3:R, 4:B \}$
- $\{ 1:R, 2:B, 5:G, 3:R, 4:B \}$
- $\{ 1:R, 2:B, 5:G, 3:R, 4:B, 6:R \}$
- $\{ 1:R, 2:B, 5:G, 3:R, 4:B, 6:R, 7:G \}$
- $\{ 1:R, 2:B, 5:G, 3:R, 4:B, 6:R, 7:G, 8:B \}$
- $\{ 1:R, 2:B, 5:G, 3:R, 4:B, 6:R, 7:G, 8:B, 9:G \}$
- $\{ 1:R, 2:B, 5:G, 3:R, 4:B, 6:R, 7:G, 8:B, 9:G, 10:B \}$

John  
Boyington

### Problem 2

In my given example, FC/LP provides about the same time saving as MRV/LCV. This is because the FC will use about as much time as the line

"if value is consistent with assignment according to Constraints[esp] then"  
in the backtracking search algorithm.

AC-3 as a preprocessing step is not useful, as the domains of a 3-coloring problem with no assignments is already consistent.



John  
Bayington

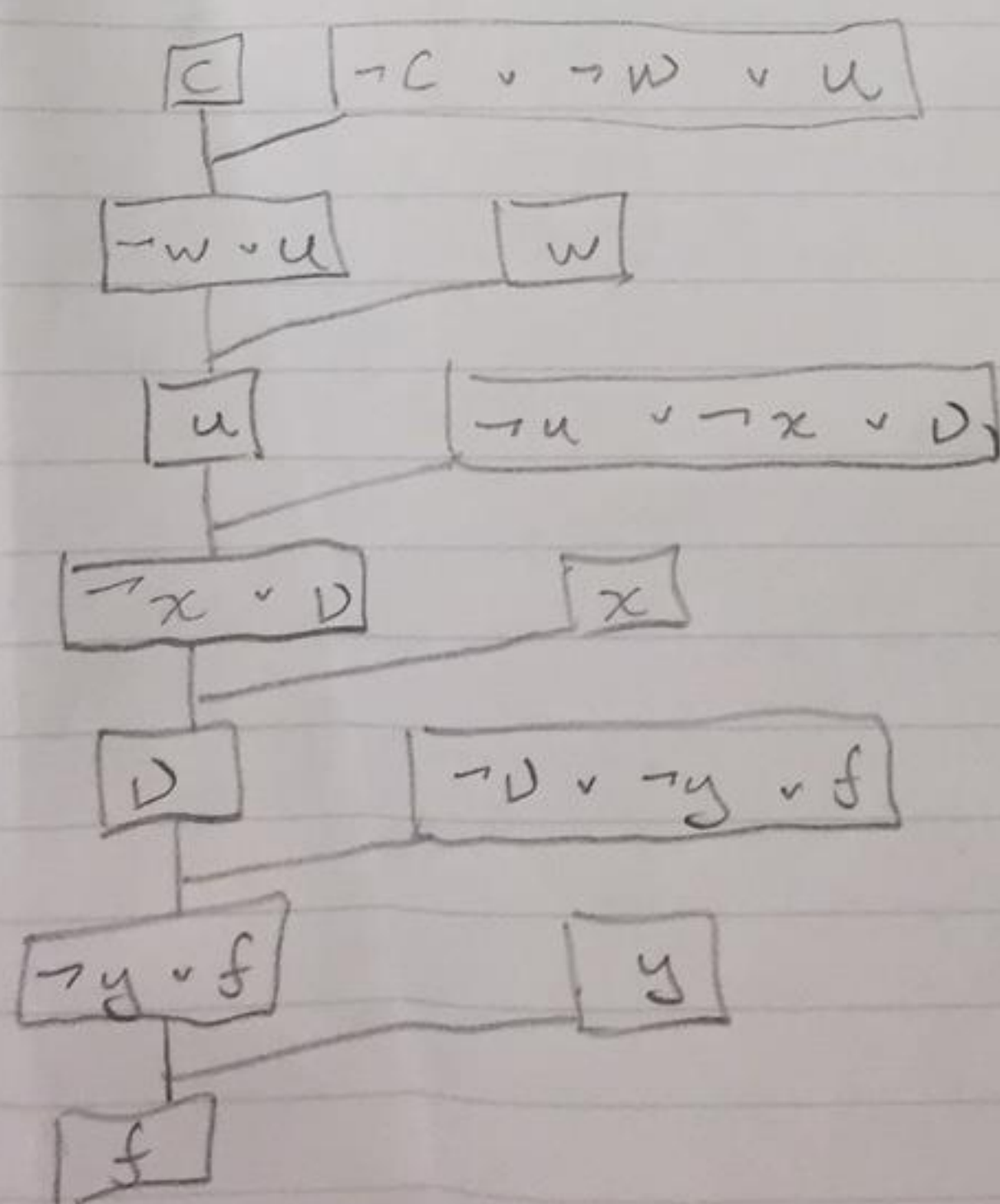
### Problem 3

When seeking to Unify facts and rules, the algorithm just has to check if the known facts is enough to trigger the rule, which follows well the order of forward chaining.

Backward chaining requires that the output from a certain rule be known and matches the later inputs, which is not necessarily intuitive for the functions in consideration.

To use this paradigm in a production system, one would write rules that check for existence of a variable before completing a particular step, then provide a few initial facts to the KB and the FC would occur naturally as (run) was executed.

Trace:





#### Problem 4

Yes, representing the rules as a set of interrelated nodes allows an algorithm to avoid wasteful steps like applying facts to rules that aren't relevant to the solution.

Propagating constraints after a variable is chosen may force other values as well, potentially leading to a solution faster.

Preprocessing with arc consistency will also remove redundant or unnecessary calculations.

The rules would have to look like a graph with a goal node, so the algorithm would know to quit when the goal was found.