Knowledge base for Wumpus world

Atomic Proposition Variables for Wumpus world

1. let $P_{i,j}$ be true if there is a pit in the room $[i,j]$
2. let $B_{i,j}$ be true if agent perceives breeze in $[i,j]$
3. let $W_{i,j}$ be true if there is Wumpus in square $[i,j]$
4. let $S_{i,j}$ be true if agent perceives stench in $[i,j]$
5. let $V_{i,j}$ be true if that square $[i,j]$ is visited

$R_1 \Rightarrow \neg S_{11} \rightarrow \neg W_{11} \wedge \neg W_{12} \wedge \neg W_{21}$

$R_2 \Rightarrow \neg S_{21} \rightarrow \neg W_{11} \wedge \neg W_{21} \wedge \neg W_{22} \wedge \neg W_{31}$

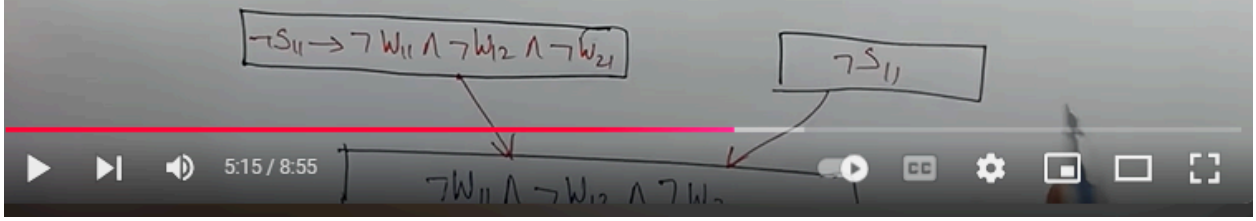
$R_3 \Rightarrow \neg S_{12} \Rightarrow \neg W_{11} \wedge \neg W_{12} \wedge \neg W_{22} \wedge \neg W_{13}$

$R_4 \Rightarrow S_{12} \rightarrow W_{13} \vee W_{12} \vee W_{22} \vee W_{11}$

→ We can poove Wumpus is in the room (1,3) using propositional rules

① Apply Modus ponens with $\neg S_{11}$ & R_1:

→ We first apply MP rule with R_1 which is $\neg S_{11} \rightarrow \neg W_{11} \wedge \neg W_{12} \wedge \neg W_{21}$ & $\neg S_{11}$ which will gives the o/p $\neg W_{11} \wedge W_{12} \wedge W_{12}$.



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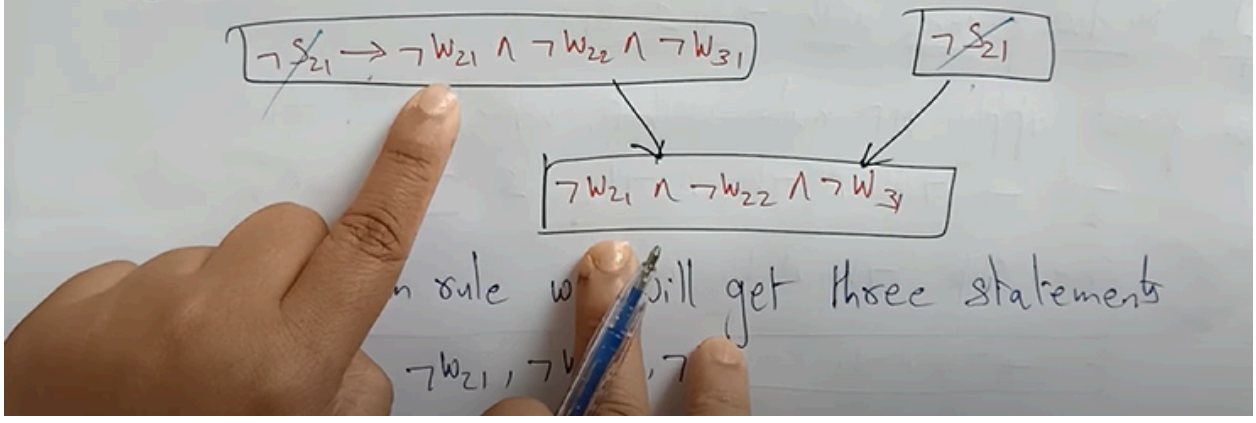
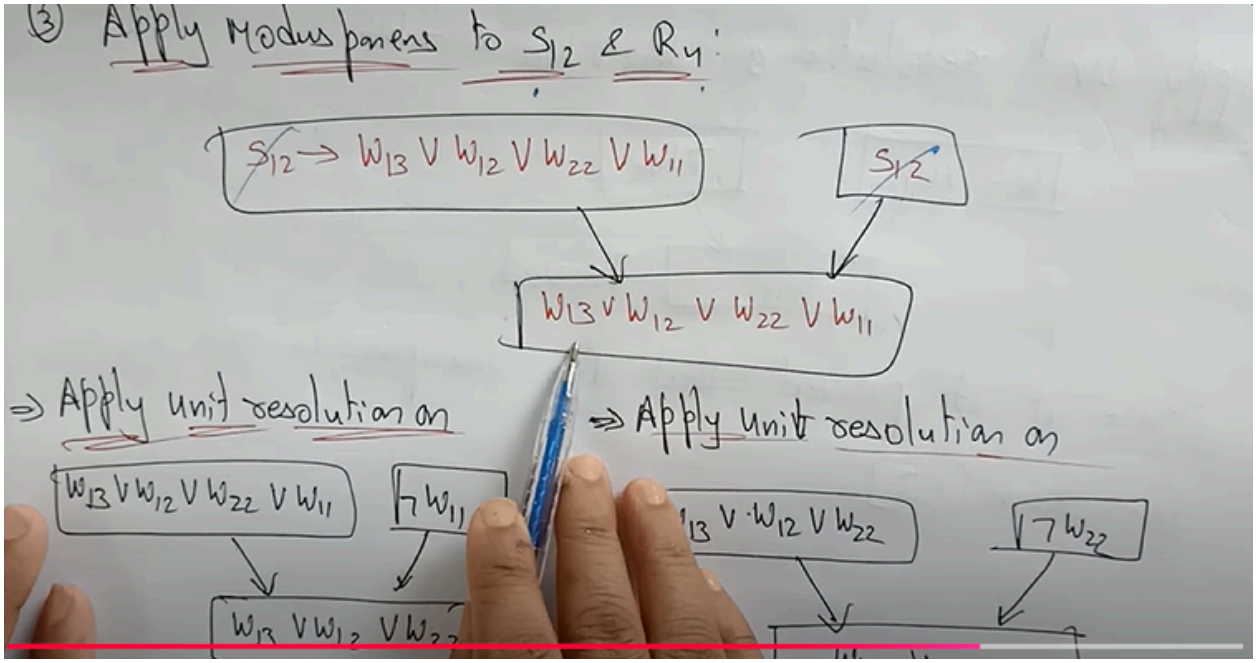
$\neg W_{11}$, $\neg W_{12}$ & $\neg W_{21}$

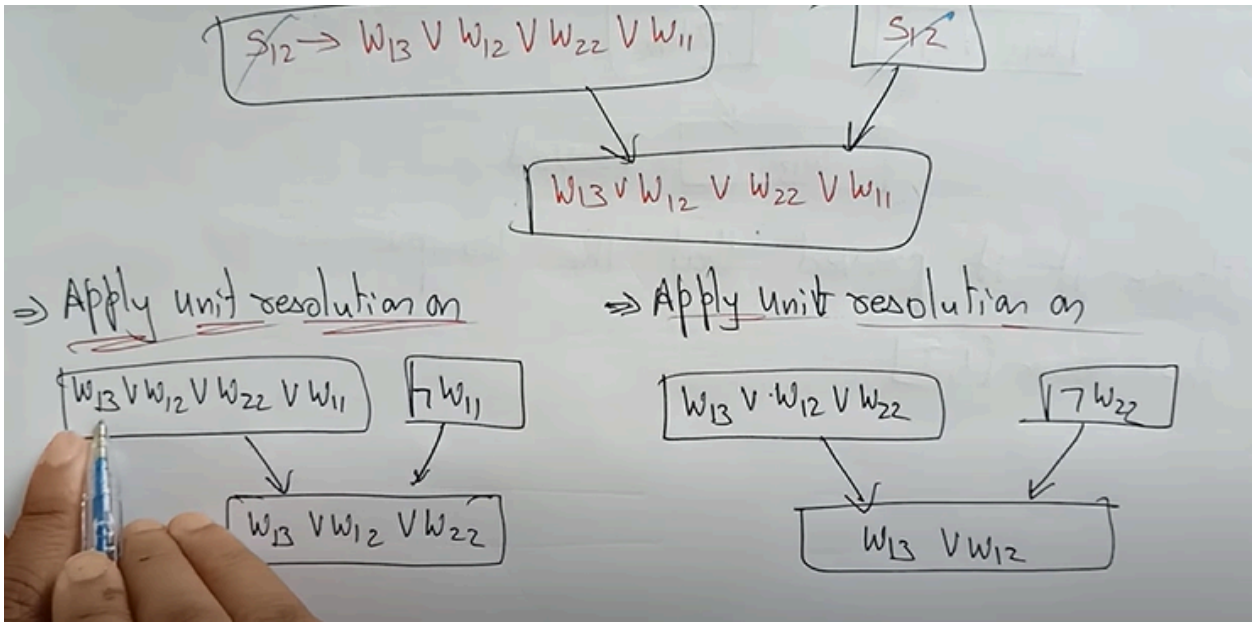
→ Apply Modus ponens to $\neg S_{21}$ & R_2:



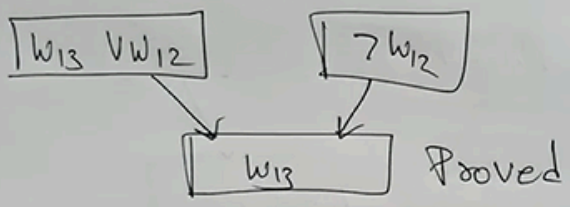
rule w ill get three statements

$\neg W_{21}$, $\neg W$, $\neg$


③ Apply Modus ponens to S_{12} & R_4:
$S_{12} \rightarrow W_{13} \vee W_{12} \vee W_{22} \vee W_{11}$
S_{12}
$W_{13} \vee W_{12} \vee W_{22} \vee W_{11}$
⇒ Apply unit resolution on
$W_{13} \vee W_{12} \vee W_{22} \vee W_{11}$
$\neg W_{11}$
⇒ Apply unit resolution on
$W_{13} \vee W_{12} \vee W_{22}$
$\neg W_{22}$


$S_{12} \rightarrow W_{13} \vee W_{12} \vee W_{22} \vee W_{11}$
S_{12}
$W_{13} \vee W_{12} \vee W_{22} \vee W_{11}$
⇒ Apply unit resolution on
$W_{13} \vee W_{12} \vee W_{22} \vee W_{11}$
$\neg W_{11}$
$W_{13} \vee W_{12} \vee W_{22}$
⇒ Apply unit resolution on
$W_{13} \vee W_{12} \vee W_{22}$
$\neg W_{22}$
$W_{13} \vee W_{12}$

⇒ Apply unit resolution on $W_{13} \vee W_{12}$ & $\neg W_{12}$:



Proved

Hence it it proved that the wumpus is in the room [1,3]