

Given:

R1: $\neg P_{1,1}$
R2: $\neg W_{1,1}$
R3: $B_{2,1}$
R4: $S_{1,2}$
R5: $S_{1,2} \leftrightarrow (W_{1,1} \vee W_{2,2} \vee W_{1,3})$
R6: $B_{1,2} \leftrightarrow (P_{1,1} \vee P_{2,2} \vee P_{3,1})$
R7: $S_{2,1} \leftrightarrow (W_{1,1} \vee W_{2,2} \vee W_{3,1})$
R8: $\neg B_{1,2}$
R9: $\neg S_{2,1}$

Prove: There is no pit in [2,2]

R10: $(B_{1,2} \rightarrow (P_{1,1} \vee P_{2,2} \vee P_{3,1})) \wedge ((P_{1,1} \vee P_{2,2} \vee P_{3,1}) \rightarrow B_{1,2})$ biconditional elimination (R6)
R11: $(P_{1,1} \vee P_{2,2} \vee P_{3,1}) \rightarrow B_{1,2}$ And Elimination (R10)
R12: $\neg B_{1,2} \rightarrow \neg(P_{1,1} \vee P_{2,2} \vee P_{3,1})$ Contraposition
R13: $\neg(P_{1,1} \vee P_{2,2} \vee P_{3,1})$ Modus Ponens (R8)
R14: $\neg P_{1,1} \wedge \neg P_{2,2} \wedge \neg P_{3,1}$ de Morgan Rule
R15: $\neg P_{2,2}$ And Elimination (R14)

There is no pit in [2,2]

Prove: there is a Wumpus in [1,3]

R16: $(S_{2,1} \rightarrow (W_{1,1} \vee W_{2,2} \vee W_{3,1})) \wedge ((W_{1,1} \vee W_{2,2} \vee W_{3,1}) \rightarrow S_{2,1})$ biconditional elimination (R7)
R17: $(W_{1,1} \vee W_{2,2} \vee W_{3,1}) \rightarrow S_{2,1}$ And Elimination (R16)
R18: $\neg S_{2,1} \rightarrow \neg(W_{1,1} \vee W_{2,2} \vee W_{3,1})$ Contraposition
R19: $\neg(W_{1,1} \vee W_{2,2} \vee W_{3,1})$ Modus Ponens (R9)
R20: $\neg W_{1,1} \wedge \neg W_{2,2} \wedge \neg W_{3,1}$ de Morgan Rule
R21: $\neg W_{2,2}$ And Elimination (R20)
R22: $(S_{1,2} \rightarrow (W_{1,1} \vee W_{2,2} \vee W_{1,3})) \wedge ((W_{1,1} \vee W_{2,2} \vee W_{1,3}) \rightarrow S_{1,2})$ biconditional elimination (R5)
R23: $(W_{1,1} \vee W_{2,2} \vee W_{1,3}) \rightarrow S_{1,2}$ And Elimination (R22)
R24: $W_{1,1} \vee W_{2,2} \vee W_{1,3}$ Modus Ponens (R23)
R25: $W_{1,3}$ Unit Resolution (R2) (R21)
There is a WUMPUS in [1,3]