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Resolution – 1.2.

Prove $U_2 = (B \to A) \wedge (C \to A) \to (B \wedge C \to A)$ – theorem

$\neg U_2 = \neg((B \overset{1}{\to} A) \wedge (C \overset{2}{\to} A) \overset{3}{\to} (B \wedge C \overset{4}{\to} A))$

- Use $X \to Y \equiv \neg X \vee Y$ for 1, 2, 4

$\neg U_2 = \neg((\neg B \vee A) \wedge (\neg C \vee A) \overset{3}{\to} (\neg B \vee \neg C \vee A))$

- Again for 3

$\neg U_2 = \neg(\neg((\neg B \vee A) \wedge (\neg C \vee A)) \vee (\neg B \vee \neg C \vee A))$

- Apply de Morgan's law

$\neg U_2 = (\neg B \vee A) \wedge (\neg C \vee A) \wedge B \wedge C \wedge \neg A$ – CNF, 5 clauses

- Take $S = \{\underbrace{\neg B \vee A}_{C_1}, \underbrace{\neg C \vee A}_{C_2}, \underbrace{B}_{C_3}, \underbrace{C}_{C_4}, \underbrace{\neg A}_{C_5}\}$

- Apply resolution alg.

$C_1 = \neg B \vee A$ $\qquad C_5 = \neg A$

$C_6 = Res_A(C_1, C_5) = \neg B$ $\qquad C_3 = B$

$C_7 = Res_B(C_3, C_6) = \square$

The empty clause ($\square$) has been derived from $CNF(\neg U_2)$

$\Rightarrow U_2$ is a theorem