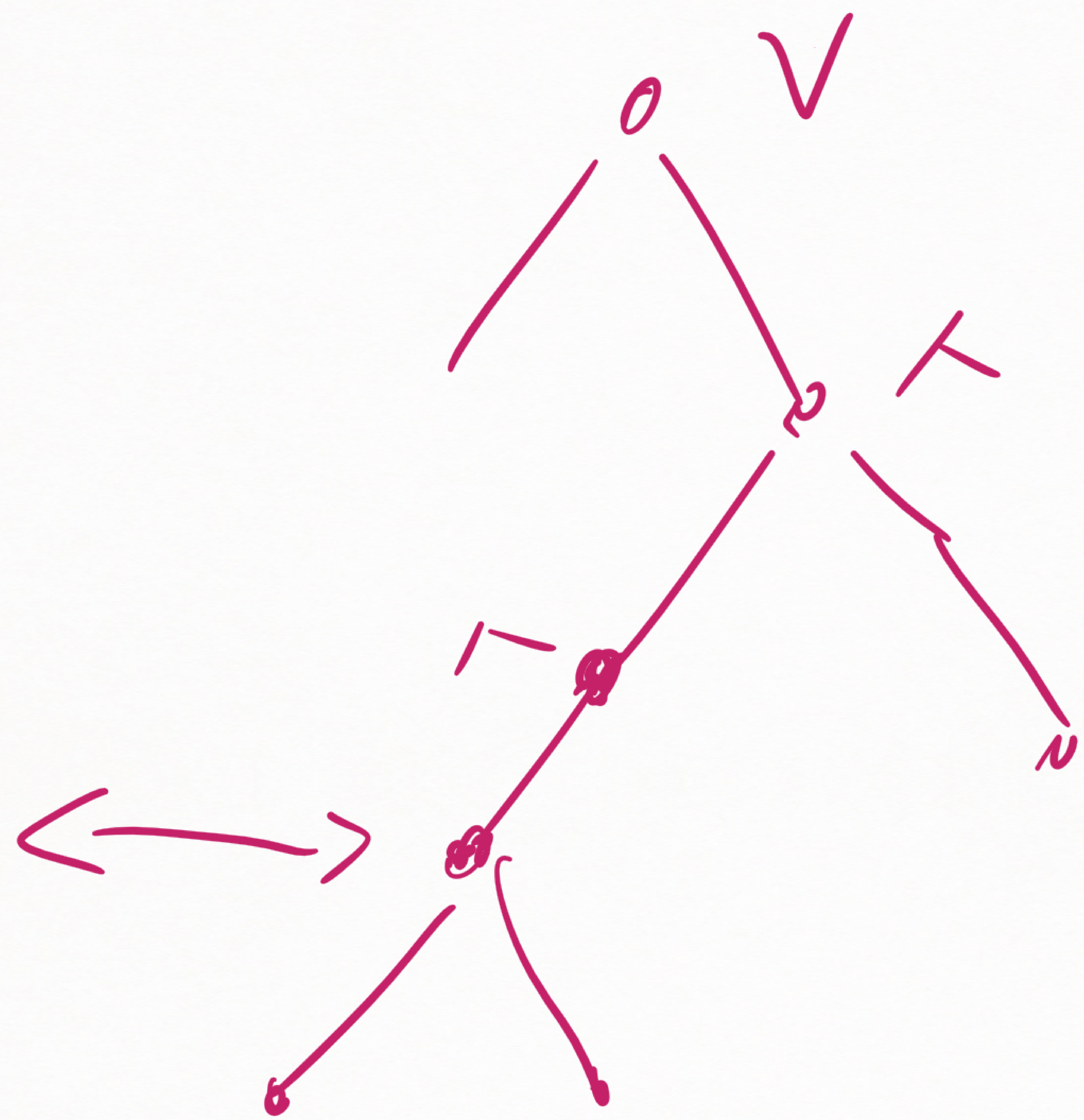


$$\neg(\Phi_1 \leftrightarrow \Phi_2)$$

$$\neg((\Phi_1 \to \Phi_2) \wedge (\Phi_2 \to \Phi_1))$$

$$\neg((\neg\Phi_1 \vee \Phi_2) \wedge (\neg\Phi_2 \vee \Phi_1))$$

$$\neg(\neg\Phi_1 \vee \Phi_2) \vee \neg(\neg\Phi_2 \vee \Phi_1)$$

$$(\Phi_1 \wedge \neg\Phi_2) \vee (\Phi_2 \wedge \neg\Phi_1)$$

$$(\Phi_1 \vee \Phi_2) \wedge (\Phi_1 \vee \neg\Phi_1) \wedge \underbrace{(\neg\Phi_2 \vee \Phi_2)}_{T} \wedge (\neg\Phi_2 \vee \neg\Phi_1)$$

$$(\Phi_1 \vee \Phi_2) \wedge (\neg\Phi_1 \vee \neg\Phi_2)$$

$(P \leftrightarrow (Q \leftrightarrow (R \leftrightarrow \bot)))$

TB12 $\Longrightarrow$

$(P \leftrightarrow (Q \leftrightarrow \neg R))$

Obvious positions: ε equivalence not obvious

n obvious position

2

Renaming: fresh S

$$\underbrace{P \leftrightarrow S}_{\text{unplanned}} \wedge \underbrace{S \leftrightarrow (Q \leftrightarrow \neg R)}_{\text{def polat pos 2 is zero}}$$

$(\neg P \vee S) \wedge (\neg S \vee P) \wedge (S \to (Q \leftrightarrow \neg R)) \wedge (\cancel{Q} \leftrightarrow \neg R) \to S$

$\neg S \vee ((\neg Q \vee \neg R) \wedge (R \vee Q))$ pol n pol -n

$\neg((Q \wedge \neg R) \vee (\neg Q \wedge R)) \vee S$

$(\neg S \vee \neg Q \vee \neg R) \wedge (\neg S \vee R \vee \cancel{R})$ $(\neg Q \vee R \vee S) \wedge (Q \vee \neg R \vee S)$

Φ unsat $\overset{\text{sat pres}}{\rightsquigarrow}$ acnf(Φ) linear blowup

$(L_1 \vee \dots \vee L_k) \wedge \dots \wedge (L'_1 \vee \dots \vee L'_{k'})$

Tableau: for each clause α
for all disjuncts β

$(Q \leftrightarrow \neg R)$

$(Q \to \neg R) \wedge (\neg R \to Q)$

$(\neg Q \vee \neg R) \wedge (R \vee Q)$

$C_1 \vee P \qquad C_2 \vee \neg P$

Soundness

$C_1 \vee C_2$

Show

assignment $A(C_1 \vee P) = 1$ and $A(C_2 \vee \neg P) = 1$

then $A(C_1 \vee C_2) = 1$

Proof:

Case Analysis:

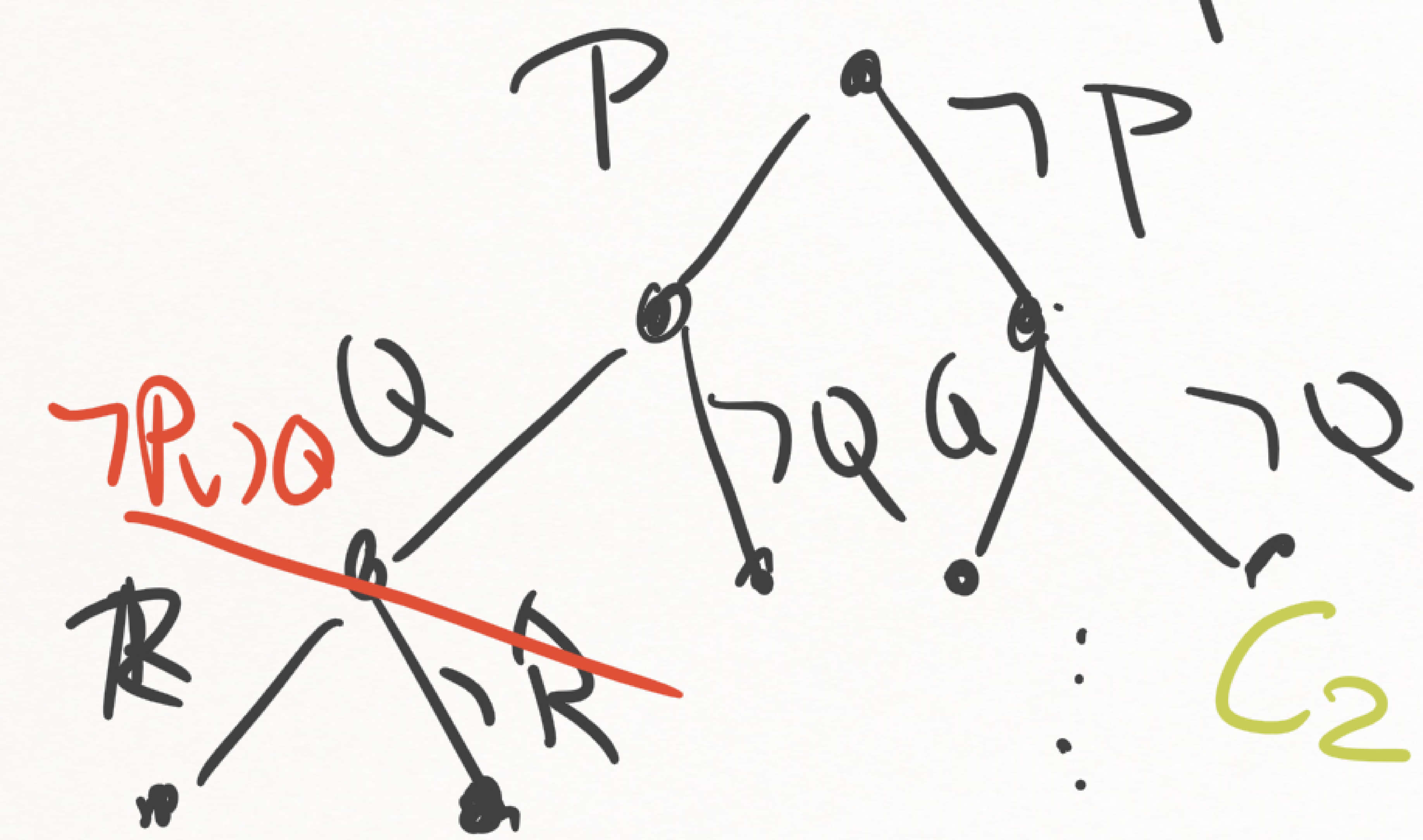
(i) $A(P) = 1$ then $A(C_2) = 1 \rightsquigarrow A(C_1 \vee C_2) = 1$

(ii) $A(P) = 0$ then $A(C_1) = 1 \rightsquigarrow A(C_1 \vee C_2) = 1$

N unsat <u>then</u> $N \overset{*}{\underset{RES}{\Longrightarrow}} \{\bot\} \cup N''$

<u>Proof</u> Semantic Tree: take prop variables from N and enumerate all valuations

$P, Q, R, S, \ldots$



path from root to leaf

N unsat.

$$\frac{\neg R \vee \neg P \qquad R \vee \neg Q}{} \underset{RES}{\Longrightarrow} \neg P \vee \neg Q$$

$R \vee R \vee \neg Q$

$\underset{FAC}{\Longrightarrow} R \vee \neg Q$

$$\frac{C_2 \subseteq \boxed{C_1}}{}$$

$$\frac{P \vee \neg P \vee C}{}$$

70~ Lock Resolution

$$P_1 \vee Q_2$$
$$\neg P_2 \vee Q_4$$
$$\xRightarrow[\text{RES}]{} Q_2 \vee Q_4 \xRightarrow[\text{FAC}]{} Q_2$$

Restrict Resolution
Compl. literals
minimal Numbers

$$P_1 \vee Q_3$$
$$\neg P_4 \vee Q_2$$
$$\neg P_4 \vee \neg Q_2$$
$$\neg P_1 \vee \neg Q_3$$

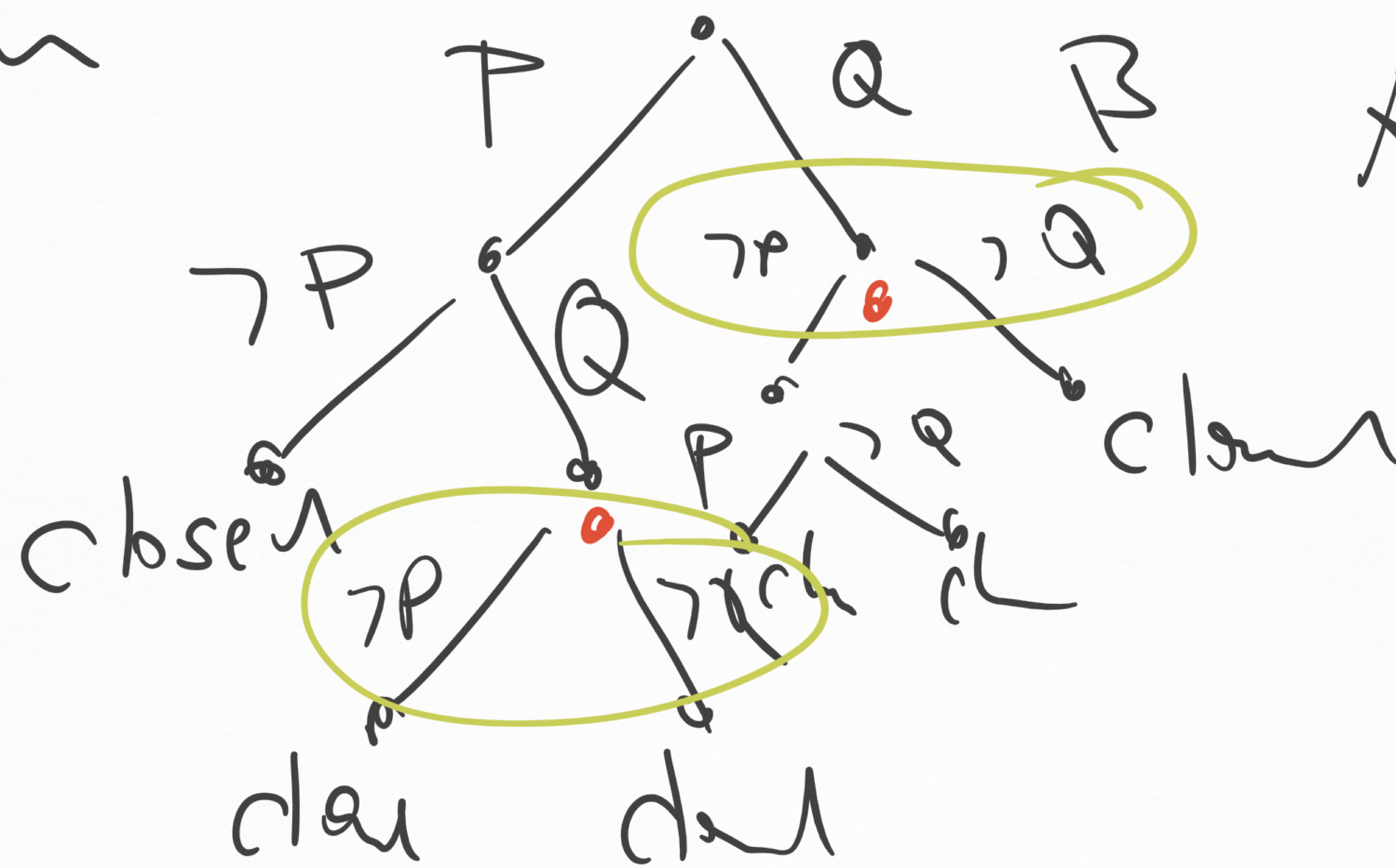
$$\neg P_4 \vee P_4$$

$$Q_3 \vee \neg Q_3$$

Linear Time

$P \vee Q \quad \neg P \vee Q \quad P \vee \neg Q \quad \neg P \vee \neg Q$

Tableau



Analytical