$$\Phi = (P \to (Q \wedge R))$$

$$\begin{tikzcd}
 & \bullet \arrow[dl, "1"'] \arrow[dr, "2"] & & \\
P \bullet & & \bullet \; Q \wedge R \arrow[dl, "21"'] \arrow[dr, "22"] & \\
 & Q \bullet & & \bullet \; R
\end{tikzcd}$$

$$\Phi|_{22} = R \neg (P \vee Q) \wedge (P \vee Q)$$

$$\Phi[R]_{21} = (P \to (R \wedge R))$$

$P \leftrightarrow Q$

iff

$(P \rightarrow Q) \wedge (Q \rightarrow P)$

iff

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

Φ valid iff $\neg\Phi$ unsatisfiable

$p \to p$ valid

$\neg(p \to p)$ unsatisfiable

$\neg p$

p

unsat

$\neg(p \to p)$
iff
$(p \wedge \neg p)$

$$\neg((P \land (P \to Q)) \to Q) \quad \alpha$$

Set of sequents

$$P \land (P \to Q) \quad \alpha$$

$$\neg Q$$

$$P$$

$$P \to Q \quad \beta$$

$$\neg P \qquad Q$$

unsat

$N \longrightarrow_T N'$ soundness

$A(N)$ then $A(N')$

Termination

measure $\mu(N) \to (\ell, k, n)$

$\ell, k, n \in \mathbb{N}$, lex $>$

Soundness + Termination

Completeness

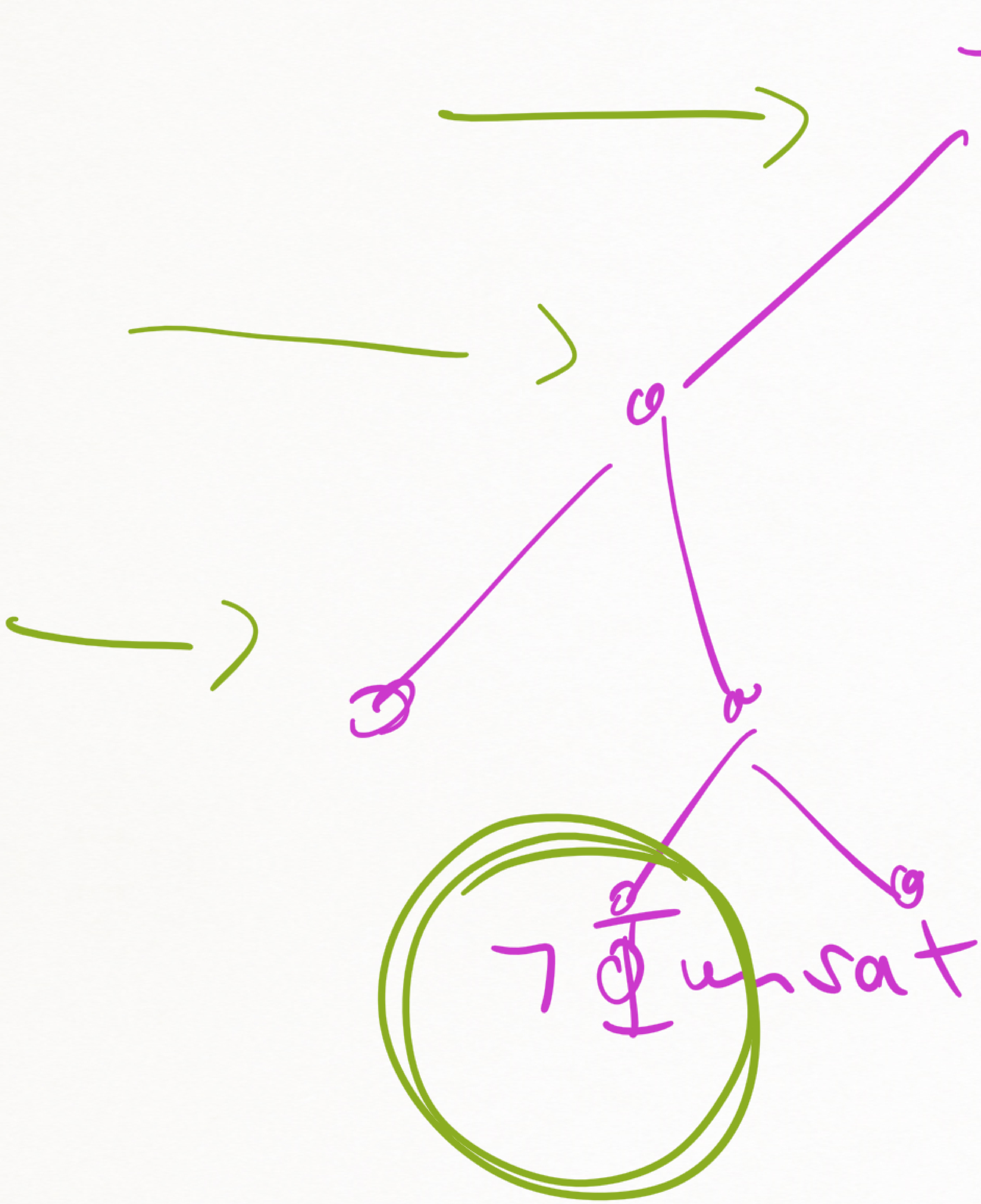
if $\neg\Phi$ unsat then $\Longrightarrow^{+}_{T}$ closed tableau

$\{[\neg\Phi]\} \Longrightarrow^{+}_{T} \{S_1, \ldots, S_n\}$ Termination

Contradiction: assume S_i not closed

$A_{S_i}(S_i) = 1 \qquad \neg\Phi \in S_i$

$A_{S_i}(\neg\Phi) \rightsquigarrow \neg\Phi$ sat



exp. many branches containing ¬Φ

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

iff

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

exp blowup: (i) elim $\leftrightarrow$

(ii) distributive law

$\wedge \; \vee$