## **)** [] . /





















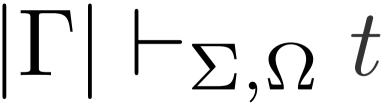












$$|\Gamma| \vdash_{\Sigma,\Omega} t^d$$

$$\Gamma \vdash_{\Sigma,\Omega} t : ^d A$$



## Soundness &

## Completeness

## What does a mode derivation mean for a raw term?

Mode derivations are just bidirectional typing derivations with types erased.



$$\frac{x \in V}{V \vdash_{\Sigma,\Omega} x^{\Rightarrow}} \text{ VAR}^{\Rightarrow} \qquad \frac{\cdot \vdash_{\Sigma} A \qquad V \vdash_{\Sigma,\Omega} t^{\Leftarrow}}{V \vdash_{\Sigma,\Omega} (t \circ A)^{\Rightarrow}} \text{ Anno}^{\Rightarrow} \qquad \frac{V \vdash_{\Sigma,\Omega} t^{\Rightarrow}}{V \vdash_{\Sigma,\Omega} t^{\Leftarrow}} \text{ SuB}^{\Leftarrow}$$

$$\frac{V, \vec{x}_1 \vdash_{\Sigma,\Omega} t_1^{d_1} \qquad \cdots \qquad V, \vec{x}_n \vdash_{\Sigma,\Omega} t_n^{d_n}}{V \vdash_{\Sigma,\Omega} \text{ op}_o(\vec{x}_1.t_1; \dots; \vec{x}_n.t_n)^d} \text{ OP}$$

$$V \vdash_{\Sigma,\Omega} \mathsf{op}_o(\vec{x}_1.t_1;\ldots;\vec{x}_n.t_n)^d$$

for  $o: \Xi \rhd [\Delta_1] A_1^{d_1}, \dots, [\Delta_n] A_n^{d_n} \to A_0^d$ 

























