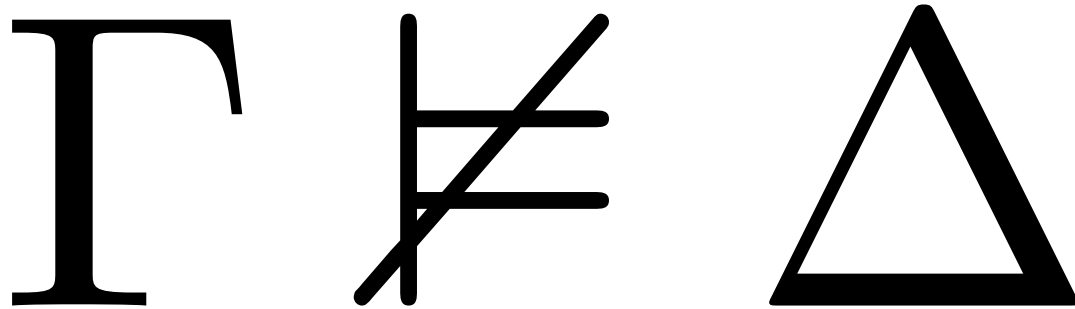


We can use the rules to show this is universally valid,
or, if it is not, to generate
a counterexample, a model in which



some $\wedge \Gamma$ is not $\vee \Delta$

Can we use the rules to show this is somewhere valid?

We say the sequent is **satisfiable** if we can
find a model in which

some $\bigwedge \Gamma$ is $\bigvee \Delta$

Can we use the rules to show this is somewhere valid?

We say the sequent is satisfiable if we can
find a model where

some $\wedge \Gamma$ is $\vee \Delta$

$\Gamma \not\equiv \neg \vee \Delta$

$\Gamma \models \neg \forall \Delta$

We can use the rules to show this is universally valid,
or, if it is not, to generate
a counterexample, which shows

$\Gamma \not\models \neg \forall \Delta$

$$\Gamma \models \neg \forall \Delta \quad \Gamma, \forall \Delta \models$$

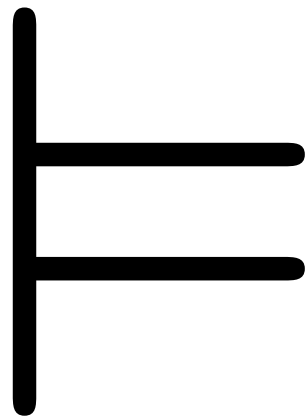
We can use the rules to show this is universally valid,

$$\Gamma, \forall \Delta \text{ is inconsistent}$$

or, if it is not, to generate
a counterexample, a model in which

$$\Gamma \not\models \neg \forall \Delta$$

$$\text{some } \bigwedge \Gamma \text{ is } \forall \Delta$$



$$\bigwedge \emptyset \models \bigvee \emptyset$$

$$\top \models \perp$$

which is only valid in the empty universe

$$\begin{aligned} & \models \\ & \Gamma \models \Delta \quad (\Gamma = \Delta = \emptyset) \\ & \bigwedge \emptyset \models \bigvee \emptyset \\ & \top \models \perp \end{aligned}$$

which is only valid in the empty universe

$$\emptyset \models \emptyset$$

$$a \models b \quad (a = b = \emptyset = \perp)$$

$$\perp \models \perp$$

which is universally true

This is a type error
— but for a mathematician

a set is just a set

there is only one emptyset