## Nesting "Global" and "Future" in LTL Formulas

## $s \models GF \phi$ "infinitely $\phi$ is two.

Each path starting with s is s.t. continuously,  $\phi$  eventually holds.

Q. Formulate the above nested pattern of LTL operator. \*  $\forall \pi \cdot \pi = \$ \Rightarrow \cdots \Rightarrow$   $(\forall \overline{\iota} \cdot \overline{\iota} \Rightarrow | \Rightarrow (\exists \overline{\iota} \cdot \overline{\iota} \Rightarrow \overline{\iota} \land \pi^{\overline{\iota}} \models \varphi))$ Q. How to prove the above nested pattern of LTL operators?

**Q.** How to **disprove** the above nested pattern of LTL operators?

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## Model Satisfaction: Exercises (6.1)



Exercise: What if we change the LHS to s<sub>2</sub>?

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## Model Satisfaction: Exercises (6.2)



Exercise: What if we change the LHS to s<sub>2</sub>?



(1)  $GF \phi \Rightarrow G\phi$ (2)  $G \phi \Rightarrow GF \phi$ (3)  $GF \phi \Leftrightarrow G\phi$ 



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