

Testing and Demonstrating Validity

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So far we've used two techniques for testing and demonstrating validity and invalidity of arguments:

- Truth Tables (in Boole)
- Building Counterexamples (in Tarski's World)

Today we're going to start learning a third technique: Proofs

Truth Tables (Boole)

Advantages of Truth Tables

- Mechanical/Robotic/Easy
- Always gives a definitive answer (VALID or INVALID) and never leaves us hanging.

Disadvantages of Truth Tables

- Mechanical/Robotic/Easy = **BORING**
- Definitive answer is limited to TT-Validity and TT-Invalidity
 - Will count lots of (logically) VALID arguments as (truth-table) INVALID
- Exponential growth: Doubles for each new atomic!
 - An argument that has six unique atomic sentences will take a 64 rows!

Building Counterexamples (Tarski's World)

Advantages of Building Counterexamples

- A counterexample world definitively demonstrates that an argument is **invalid**.
 - A counterexample is world where the premises are all true and the conclusion is false
- Requires creativity
- Challenging! Fun?
- Goes beyond the limits of truth-table validity

Disadvantages of Building Counterexamples

- Harder than Truth Tables
- The invalidity that it demonstrates is just *Tarski's World* invalidity
 - Some *logically* invalid arguments won't have counterexamples in Tarski's World
 - Example: “*a* is small. Therefore, *b* is not smaller than *a*.”
- Cannot use to demonstrate that an argument is *valid*
 - If you haven't found a counterexample world, is it because
 - the argument is valid (so no counterexample is possible)?
 - you just haven't found one yet?

Proofs (Fitch)

Advantages of Proofs

- A proof definitively demonstrates that an argument is **valid**
- Even more challenging than building counterexamples!
- Can be used to demonstrate *logical* validity

Disadvantages of Proofs

- Even more challenging than building counterexamples.
 - Have to learn the rules and **practice!**
- Cannot use proofs to demonstrate that an argument is *invalid*
 - If you haven't found a proof, is it because
 - the argument is invalid (so no proof is possible)?
 - you just haven't found a proof *yet*?

Strategy

From here on out, we're going to be setting aside Truth Tables and using proofs and counterexamples.