

# Logic as a Knowledge Representation Language

Chapter 7.4–7.8, 8.1–8.3, 8.5

# Logic roadmap overview

- **Propositional logic**

- Problems with propositional logic

- **First-order logic**

- Properties, relations, functions, quantifiers, ...

- Terms, sentences, wffs, axioms, theories, proofs, ...

- Variations and extensions to first-order logic

- **Logical agents**

- Reflex agents

- Representing change: situation calculus, frame problem

- Preferences on actions

- Goal-based agents

# Disclaimer



“Logic, like whiskey, loses its beneficial effect when taken in too large quantities.”

- *Lord Dunsany*

# Big Ideas

- **Logic**: great knowledge representation (KR) language for many AI problems
- **Propositional logic**: simple foundation and fine for many AI problems
- **First order logic (FOL)**: more expressive as a KR language; needed for many AI problems
- **Variations** on classical FOL are common: horn logic, higher-order logic, modal logic, three-valued logic, probabilistic logic, fuzzy logic, etc.

# AI Use Cases for Logic

Logic has many usecases even in a time dominated by deep learning, including these examples:

- Modeling and using knowledge in the Hunt the Wumpus game
- Allowing agents to develop complex plans to achieve a goal and create optimal plans
- Defining and using semantic knowledge graphs such as [schema.org](https://schema.org/) and [Wikidata](https://www.wikidata.org/)
- Adding features to neural network systems

*Fín*