

Artificial Intelligence

Logic and Inferences

**Readings: Chapter 7 of Russell &
Norvig.**

Components of Propositional Logic

- Logic constants: True (1), and False (0)
- Propositional variables: $X = \{p_1, q_2, \dots\}$, a set of Boolean variables
- Logical connectives: $\mathcal{F} = \{\neg, \wedge, \vee, \Rightarrow, \Leftrightarrow, \dots\}$
- Logical sentences: $L(X, \mathcal{F})$, expressions built from X and \mathcal{F}
- Logical interpretations: a mapping θ from X to $\{0, 1\}$
- Logical evaluations: a process of applying a mapping θ to sentences in $L(X, \mathcal{F})$ (to obtain a value in $\{0, 1\}$)

Propositional Variables

- Also called Boolean variables, 0-1 variables.
- Every statement can be represented by a propositional variable:
 - p_1 = “It is sunny today”
 - p_2 = “Tom went to school yesterday”
 - p_3 = “ $f(x) = 0$ has two solutions”
 - p_4 = “point A is on line \overline{BC} ”
 - p_5 = “place a queen at position (1, 2) on a 8 by 8 chessboard”
 - ...