**Propositional logic: Syntax:** Propositional logic is the simplest form of logic languages. It defines a set of propositional symbols (atoms) and these propositional atoms can be connected with logic connectives, such as negation, conjunction, disjunction, etc. to form propositional formulas. Parentheses may be added to indicate binding sequence.

**Propositional logic: Semantics:** Each model specifies a true/false value for each propositional symbol. Given n symbols, we will have $2^n$ possible models of the world. Hence, given a model, we can evaluate the truth value of any logic sentence.

For example, for a propositional signature (the set of symbols), p, q, r, one possible model is p = q = r = true. Then $p \land q = true$. This can be done in a recursive fashion given well-formed propositional formulas.

**Wumpus world sentences:** Given a problem, we must first identify the propositional symbols and then express the sentences as logic formulas. Think about how to express “Pits cause breezes in adjacent squares”. Complex meanings can be expressed by sentences. Care must be taken when converting sentences. How do you express the following?

- She goes: A
- I go: B
- If she goes, then I go. \( A \implies B \)
- I go only if she goes. \( B \implies A \)
- I won’t go until she goes. \( \neg A \implies \neg B \)

**Truth tables for inference:** How can we perform inference? Recall that to infer about whether \( \alpha \) is true or not, we need to check whether the models for which KB is true also make \( \alpha \) true (or KB entails \( \alpha \)). We can list all the possible models as all combinations of the atoms. Our KB indicates the ones that are compatible with our knowledge. We then check whether \( \alpha \) always holds in these models. If so, we know that KB entails \( \alpha \).

1) How many propositional symbols are there in our Wumpus world? B, P, S, G, W for each cell.
2) How many sentences are in our KB initially? Expressing that Pits cause breezes in adjacent squares, Wumpus cause stench in adjacent squares, etc.
3) Sensing will add sentences into our KB.

**Logical equivalence:** Given that inference by enumeration is computationally challenging, other methods are needed. Rules for simplifying logic inference.