Tautologies

- A **tautology** is a sentence whose truth table contains nothing but T's in the column under the main connective.

Logical truth

- A sentence is **logically true** or **logically necessary** if it *must* be true (as a matter of logic); i.e. if it's true in all possible circumstances.
  - Any argument whose conclusion is logically true is valid.
  - Even an argument with *no premises at all*.
  - Conversely: any sentence that follows from the null set of premises is a logical truth.

Tautology and logical truth

- All tautologies are logical truths.
- Not all logical truths are tautologies.
  - SameRow(a, a)
  - b = b
  - ¬Between(a, b, b)
  - ¬(Large(a) ∧ Small(a))

TT-possibility

- A sentence is TT-possible if its truth table contains at least one T under the main connective.
  - What is the relation between the following claims:

    1. P is TT-possible
    2. ¬P is TT-possible
    3. P is a tautology
    4. ¬P is a tautology
  - Answer: P is TT-possible if and only if ¬P is not a tautology; ¬P is TT-possible if and only if P is not a tautology.

Logical possibility and TT-possibility

- A sentence is logically possible if it *might* (as far as logic is concerned) be true; if it is true in *some* possible circumstance.
  - P is logically possible if and only if ¬P is not logically necessary.
- All logically possible sentences are TT-possible, but not all TT-possible sentences are logically possible.

For next week:

- Read: 4.1; optionally, 4.2-4.4
  - Do the 'You try it' exercises.
  - If you've never done so, you might also try getting the hang of the 'Boolean search' mechanism of some Internet search engine - see exercise ***.
- Do exercises 3.21 (48%), 4.2 (24%), 4.4-4.7 (7% each).