

Math 3336

Applications of Propositional Logic

Translating English Sentences

Steps to convert an English sentence to a statement in propositional logic:

1. Identify simple propositions and represent using propositional variables.
2. Determine appropriate logical connectives.

Examples: Translate the given statement into propositional logic using the propositions provided.

1. You cannot edit a protected Wikipedia entry unless you are an administrator.

e = You can edit a protected Wikipedia entry.

a = You are an administrator.

Recall: q unless $\neg p$ is a different way to express conditional $p \rightarrow q$.

Recall: contrapositive $\neg q \rightarrow \neg p$ is logically equivalent to conditional $p \rightarrow q$.

2. (only if)

The match is burning only if there is oxygen in the room.

b = The match is burning.

o = There is oxygen in the room.

3. You can access the Internet from campus only if you are a computer science major or you are not a freshman.
a = You can access the Internet from campus.
c = You are a computer science major.
f = You are a freshman.

Logic Puzzles



RAYMOND SMULLYAN (1919 - 2017)

Example: An island has two kinds of inhabitants, *knights*, who always tell the truth, and *knaves*, who always lie.

You go to the island and meet A and B.

- A says "B is a knight."
- B says "The two of us are of opposite types."

What are the types are A and B?

- A says "We are both knaves."
- B says nothing.

Example: When three professors are seated in a restaurant, the hostess asks them: "Does everyone want coffee?"

The first professor says: "I do not know."

The second professor says: "I do not know."

Finally, the third professor says: "No, not everyone wants coffee."

The hostess comes back and gives coffee to the professors who want it. How did she figure out who wants coffee?