

Introduction to Logic

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Applications of Logic

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c: You are a computer science major

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$q \wedge \neg r \rightarrow \neg p$.

Checking consistency of system specifications

- You are given a set of specifications
- You need to check the consistency of specifications

When specifications are not consistent, there would be no way to develop a system that satisfies all specifications.

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Not consistent

Are these system specifications consistent?

- The system is in multiuser state if and only if it is operating normally.
- If the system is operating normally, the kernel is functioning.
- The kernel is not functioning or the system is in interrupt mode.
- If the system is not in multiuser state, then it is in interrupt mode.
- The system is not in interrupt mode.

Logic Puzzles

1. Raymond Smullyan posed many puzzles about an island that has two kinds of inhabitants, knights, who always tell the truth, and their opposites, knaves, who always lie. You encounter two people A and B. What are A and B if A says B is a knight and B says "The two of us are opposite types"

2. 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 then 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 wanted coffee?

3. Suppose there are signs on the doors to two rooms. The sign on the first door reads "In this room there is a lady, and in the other one there is a tiger"; and the sign on the second door reads "In one of these rooms, there is a lady, and in one of them there is a tiger." Suppose that you know that one of these signs is true and the other is false. Behind which door is the lady?