



CS1001

Lecture 21

Overview

- Projects
- Predicate Logic

Goals

- Learn some predicate logic

Assignments

- Brookshear: Chapter 11
- Read linked documents on these slides (slides will be posted in courseworks)

Induction

- A formal proof technique
 - Prove a ground case
 - Prove every case “one more” than some case is also true (prove $n+1$ *assuming* n)

Propositional Logic

- Symbols (variables holding true/false)
- Operators
- Key Point: The logic system does *not* rely on the actual values inside the variables. You can reason without knowing the actual values (like an algorithm)
- $A \text{ and } B \rightarrow A$

Logic Rules

- There are a number of rules for introducing/removing
- Core operators: And, Or, Not, Implies

A Puzzle Introduction (Smullyan)

- There are two casket makers, Bellini and Cellini
 - All Bellini caskets have *true* inscriptions
 - All Cellini caskets have *false* inscriptions

A Puzzle (Smullyan)

A certain Florentine Nobleman gave very lavish entertainments, the high point of which was a game in which the prize was a valuable jewel. This nobleman knew the story of the caskets and designed his game accordingly. He had three caskets, Gold, Silver, and Lead, and inside one of them was the jewel. He explained to his company that each casket was made either by Bellini or Cellini (not any of their sons). The first person who could guess which casket contained the jewel, and who could prove his guess correct, would be awarded the jewel. Here are the inscriptions:

If the jewel is in the silver casket, then the silver casket was fashioned by Bellini

GOLD

If the Jewel is in this casket, then the gold casket was fashioned by Cellini

SILVER

The casket which really contains the jewel was fashioned by Cellini

LEAD

(5 pt.) Which casket contains the jewel? Please explain your answer.