

Math 557: Mathematical Logic

Homework # 2

August 28, 2000

1. Formulate the following argument as a propositional formula.

If it has snowed, it will be poor driving. If it is poor driving,
I will be late unless I start early. Indeed, it has snowed.
Therefore, I must start early to avoid being late.

2. Use the tableau method to demonstrate that this formula is logically valid.
3. Brown, Jones, and Smith are suspected of a crime. They testify as follows:

Brown: Jones is guilty and Smith is innocent.

Jones: If Brown is guilty then so is Smith.

Smith: I'm innocent, but at least one of the others is guilty.

Let b , j , and s be the statements "Brown is innocent," "Jones is innocent," "Smith is innocent". Express the testimony of each suspect as a propositional formula. Write a truth table for the three testimonies.

4. Use the above truth table to answer the following questions:
 - (a) Are the three testimonies consistent?
 - (b) The testimony of one of the suspects follows from that of another. Which from which?
 - (c) Assuming everybody is innocent, who committed perjury?
 - (d) Assuming all testimony is true, who is innocent and who is guilty?
 - (e) Assuming that the innocent told the truth and the guilty told lies, who is innocent and who is guilty?