

CSC242: Homework 2.3

AIMA Chapter 7.5

1. Briefly define the following properties of a sentence or set of sentences:

- (a) Satisfiable
- (b) Unsatisfiable
- (c) Tautology

2. Briefly define the following properties of inference rules:

- (a) Soundness
- (b) Completeness

3. Prove that the following inference rules are sound:

- (a) Double Negation: $\frac{\neg\neg P}{P}$
- (b) *Modus Tollens*: $\frac{P \Rightarrow Q, \neg Q}{\neg P}$

4. One rule of thumb for faculty hiring might be that a person who is not sociable ($\neg S$) is tenurable (T) if he or she is brilliant (B), but otherwise is not tenurable. Which of the following are correct representations of this assertion?

- (a) $(\neg S \wedge T) \iff B$
- (b) $\neg S \Rightarrow (T \iff B)$
- (c) $\neg S \Rightarrow ((B \Rightarrow T) \vee \neg T)$

5. Use resolution to prove the sentence $\neg A \wedge \neg B$ from the following knowledge base:

S1: $A \iff (B \vee E)$

S2: $E \Rightarrow D$

S3: $C \wedge F \Rightarrow \neg B$

S4: $E \Rightarrow B$

S5: $B \Rightarrow F$

S6: $B \Rightarrow C$

6. Briefly explain why a knowledge base that can be expressed entirely as Horn clauses might be A Good Thing.