

# CS331 (Spring 2017): Introduction to Artificial Intelligence

## Written Assignment #2

Date handed out: April 25, 2018

Date due: May 2, 2018 at the start of class

Total: 28 points

The written portion of this assignment is to be done individually. Please hand in a pdf on Canvas. Assignments done on a word processor are preferred but not mandatory. For hand written assignments, if we cannot read your writing, we cannot mark your assignment.

1. (From 7.4 in the book) For each of the following statements, prove if it is true or false.

a)  $\text{False} \models \text{True}$  [2 points]

b)  $\text{True} \models \text{False}$  [2 points]

c)  $(A \wedge B) \models (A \Leftrightarrow B)$  [3 points]

d)  $A \Leftrightarrow B \models A \vee B$  [3 points]

2. (From 7.10 in the book) Decide whether each of the following sentences is valid, unsatisfiable or neither. Verify your decisions using truth tables or the equivalence rules of Figure 7.11.

a)  $\text{Smoke} \Rightarrow \text{Fire}$  [2 points]

b)  $(\text{Smoke} \Rightarrow \text{Fire}) \Rightarrow ((\text{Smoke} \wedge \text{Heat}) \Rightarrow \text{Fire})$  [4 points]

3. (From Exercises 7.20 and 7.12 in the book).

a) Convert the following sentences to CNF. [6 points]

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

S2:  $E \Rightarrow D$

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

S4:  $E \Rightarrow B$

S5:  $B \Rightarrow F$

S6:  $B \Rightarrow C$

b) Use resolution to prove  $\neg A \wedge \neg B$ . [6 points]