

CSE 4/563 Knowledge Representation  
Professor Shapiro  
Homework 3  
Maximum Points: 23  
Due: Wednesday, February 11, 2008  
10:30 AM for submit, 11:00 AM for hardcopy

February 4, 2007

Put your answers in a file named `hw3.ext`, for an appropriate value of `ext`. **Include your name at the top of the file.** Submit that file by executing the Unix command

```
submit_cse463 hw3.ext
```

or

```
submit_cse563 hw3.ext
```

whichever is appropriate for you. The file can be a text file, or produced by some word processing software, but it must be formatted so it is easy to read.

For the two questions in which you are asked to draw semantic tableaux, you may either include your tableaux in the file you submit, or hand the two drawings in separately at the start of lecture on the due date given above.

1. (a) (3) Draw a semantic tableau to show whether  $A \vee B \Rightarrow C, C \wedge D \Rightarrow E \models A \wedge \neg E \Rightarrow D$ .  
(b) (1) According to your tableau, is it true that  $A \vee B \Rightarrow C, C \wedge D \Rightarrow E \models A \wedge \neg E \Rightarrow D$ ?
2. (a) (3) Draw a semantic tableau to show whether  $\models \neg(A \vee (B \wedge C)) \Leftrightarrow (\neg A \wedge (B \Rightarrow \neg C))$ .  
(b) (1) According to your tableau, is it true that  $\models \neg(A \vee (B \wedge C)) \Leftrightarrow (\neg A \wedge (B \Rightarrow \neg C))$ ?
3. (a) (3) Letting  $\Gamma$  be the domain rules for CarPool World, use the `wang:entails` program to determine whether

$\Gamma, \textit{Betty drives Tom} \models \neg(\textit{Betty is the passenger} \vee \textit{Tom is the driver})$

Show the call to `wang:entails` and the value returned by it.

- (b) (1) According to your use of `wang:entails`, is it true that

$\Gamma, \textit{Betty drives Tom} \models \neg(\textit{Betty is the passenger} \vee \textit{Tom is the driver})$

4. You are to formalize the following argument so that the premises logically entail the conclusion.

Betty's soup is vegetarian only if it doesn't contain meat. Betty's soup contains meat if it contains chicken or pork. Betty's soup contains chicken and rice. Therefore Betty's soup is not vegetarian.

- (a) Choose atomic propositions, and, using them, show the formalization of each of the sentences above:
  - i. (2) Betty's soup is vegetarian only if it doesn't contain meat.
  - ii. (2) Betty's soup contains meat if it contains chicken or pork.
  - iii. (2) Betty's soup contains chicken and rice.
  - iv. (2) Betty's soup is not vegetarian.
- (b) (3) Use the `wang:entails` program to show that your formalization of the premises logically entail your formalization of the conclusion. Show the call to `wang:entails`, and the value returned.