

# 6.825 Recitation Problems: Lec. 7-8

## Exercises

October 6, 2001

### 1 Lecture 7: Resolution

#### 1.1 Resolution refutation

- Using resolution refutation, prove the last sentence in each group from the rest of the sentences in the group.

- (a)  $P \rightarrow Q$   
 $\neg P \rightarrow R$   
 $\neg Q \rightarrow R$
- (b)  $(P \rightarrow Q) \vee (R \rightarrow S)$   
 $(P \rightarrow S) \vee (R \rightarrow Q)$
- (c)  $\neg(P \wedge \neg Q) \vee \neg(\neg S \wedge \neg T)$   
 $\neg(T \vee Q)$   
 $U \rightarrow (\neg T \rightarrow (\neg S \wedge P))$   
 $\neg U$

- Use resolution refutation to do problem 6.5 from R&N.

#### 1.2 Unification

For each pair of sentences, give an MGU.

- $\text{Color}(\text{Tweety}, \text{Yellow})$        $\text{Color}(x, y)$
- $\text{Color}(\text{Tweety}, \text{Yellow})$        $\text{Color}(x, x)$
- $\text{Color}(\text{Hat}(\text{John}), \text{Blue})$        $\text{Color}(\text{Hat}(y), y)$
- $\text{R}(\text{F}(x), \text{B})$        $\text{R}(y, z)$
- $\text{R}(\text{F}(y), x)$        $\text{R}(x, \text{F}(\text{B}))$
- $\text{R}(\text{F}(y), y, x)$        $\text{R}(x, \text{F}(\text{A}), \text{F}(v))$
- $\text{Loves}(x, y)$        $\text{Loves}(y, x)$
- $\text{F}(\text{G}(w), \text{H}(w, \text{J}(x, y)))$        $\text{F}(\text{G}(v), \text{H}(u, v))$
- $\text{F}(\text{G}(w), \text{H}(w, \text{J}(x, u)))$        $\text{F}(\text{G}(v), \text{H}(u, v))$
- $\text{F}(x, \text{F}(u, x))$        $\text{F}(\text{F}(y, \text{A}), \text{F}(z, \text{F}(\text{B}, z)))$

## 2 Lecture 8

### 2.1 A silly recitation problem

symbolize the following argument, and then derive the conclusion from the premises using resolution refutation.

- Nobody who really appreciates Beethoven fails to keep silence while the Moonlight sonata is being played.
- Guinea pigs are hopelessly ignorant of music.
- No one who is hopelessly ignorant of music ever keeps silence while the moonlight sonata is being played.
- Therefore, guinea pigs never really appreciate Beethoven.

(Taken from a book by Lewis Carroll, logician and author of *Alice in Wonderland*.)

### 2.2 Another, sillier problem

You don't have to do this one. It's just for fun. Same type as the previous one. Also from Lewis Carroll

- The only animals in this house are cats
- Every animal that loves to gaze at the moon is suitable for a pet
- When I detest an animal, I avoid it
- No animals are carnivorous unless they prowl at night
- No cat fails to kill mice
- No animals ever like me, except those that are in this house
- Kangaroos are not suitable for pets
- None but carnivorous animals kill mice
- I detest animals that do not like me
- Animals that prowl at night always love to gaze at the moon
- Therefore, I always avoid a kangaroo