6.825 Resolution & Paramodulation Exercises

Solutions

October 10, 2001

1 Problem 1

Formalize each group of sentences (using the given function and predicate symbols), then prove the last from the others using resolution and paramodulation.

1. Done in class.

   ($L(x)$ = the lover of x; $D(x)$ = x drives a red car)

   - Jane's lover drives a red car
   - Fred is the only person who drives a red car
   - Therefore, Fred is Jane's lover

   1. $D(L(J))$
   2. $x = F \vee \neg D(x)$
   3. $\neg F = L(J)$
   _____
   4. $L(J) = F$ 1, 2   x/L(J)
   5. $false$ 3, 4

2. ($T(x)$ = the teacher of x; $G(x)$ = x is a good student)

   - Mrs. Abbot only teaches good students
   - John and Mary have the same teacher
   - Mrs. Abbot is Mary's teacher
   - Therefore, John is a good student

   1. $\neg T(x) = A \vee G(x)$
   2. $T(J) = T(M)$
   3. $T(M) = A$
   4. $\neg G(J)$
   _____
   5. $\neg T(J) = A$ 1, 4   x/J
   6. $\neg T(M)A$ 2, 5
   7. $false$ 3, 6

2   Problem 2

($M(x)$ = the manufacturer of part x; $W(x, y)$ = part x is stored in the warehouse of company y; $T(x)$ = part x is made of titanium; $F(x)$ = part x is fragile; use a constant for "the part I need")

- Every part is either made by FooCorp or BarCorp

- All fragile parts are stored in the warehouse of their manufacturer

- BarCorp can't manufacture titanium parts

- The part I need is fragile and made of titanium

- Therefore, the part I need is the FooCorp's warehouse

1.	$M(x) = FooCorp \lor M(x) = BarCorp$		
2.	$\neg F(y) \lor W(y, M(y))$		
3.	$\neg T(z) \lor \neg M(z) = BarCorp$		
4.	$F(Ineed)$		
5.	$T(Ineed)$		
6.	$\neg W(Ineed, FooCorp)$		
7.	$M(x) = FooCorp \lor \neg T(x)$	1, 3	z/x
8.	$M(Ineed) = FooCorp$	7, 5	x/Ineed
9.	$W(Ineed, M(Ineed))$	2, 4	y/Ineed
10.	$W(Ineed, FooCorp)$	8, 9	paramodulation
11.	$false$	6, 10	