Problem 10

Consider the following facts:

Every child loves anyone who gives the child any present.

Every child will be given some present by Santa if Santa can travel on Christmas eve.

It is foggy on Christmas eve.

Anytime it is foggy, anyone can travel if he has some source of light.

Any reindeer with a red nose is a source of light.

Prove that: If Santa has some reindeer with a red nose, then every child loves Santa.

Constants: Santa, RN – Reindeer with a red nose (some source of light), CE - Christmas Eve,

Functors: Ch(x) – x is a child, D(x) – x is day

Predicates: L(x,y) – x loves y, P(x,y) – x gives present to y, Tr(x, y) – x can travel on day y, F(x) – it is foggy on x, Has(x,y) – x has y,

Facts:

P(y,Ch(x)) -> L(Ch(x),y), Tr(Santa,D(CE)) -> P(Santa,Ch(y)), F(D(CE)), F(D(x)) ^ Has(y, RN) -> Tr(y,D(x))

Prove: Has(Santa,RN) -> L(Ch(x),Santa) or ~Has(Santa,RN) v L(Ch(x),Santa)

Knowledge Base:

(1) ~P(y,Ch(x)) v L(Ch(x),y)
(2) ~Tr(Santa,D(CE)) v P(Santa,Ch(y))
(3) F(D(CE))
(4) ~F(D(x)) v ~Has(y, RN) v Tr(y,D(x))
(5) Has(Santa,RN)
(6) ~ L(Ch(x),Santa)
(7) =(5)+(4)+(3): Tr(Santa,D(CE))
(8) =(1)+(6): ~P(y,Ch(x))
(9) = (7)+(2): P(Santa,Ch(y))
(10) = (8)+(9): NIL