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Artificial Intelligence

Problem Set 3

Problem 1:

1.A)

1.B)

1.C)

1.D)

1.E)

1.F)

1.G)

1.H)

1.I)

1.J)

Problem 2:

Using resolution proving, show that I is a consequence of A, D, F, and G.

We start with the set of clauses that includes , and work towards a contradiction. First, I rename the variables in each clause so that they are not confused with each other. This is to emphasize that the people and times in each clause may all be different variables (13 different variables in this case), until a substitution is made that makes them equivalent.

First, We resolve with A by making the substitution :

Next, we resolve with F by substituting and :

b

Next we resolve with G by substituting and :

Next we resolve A and G by substituting and :

Next we resolve A and F by substituting and :

Next we resolve D.b and G by substituting and :

However,

I.e. the set of clauses are jointly false, and we have reached a contradiction. Thus I is a consequence of A, D, F, and G.

Problem 3:

Using Resolution theorem proving, show that J is a concequence of A, B, E, F, and H. We use the same method as before, combining the set of clauses, with J negated. Note that the negation of J gives

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First, we resolve J.b with E by substituting and

Now we resolve A with E by substituting and

Next we resolve E with H by substituting and

Next we resolve B with F by substituting and :

Next we resolve A with B by substituting and

Next we resolve F with H.a by substituting and :

Next we resolve F with H.b by substituting and :

Now, we can substitute and to resolve J.a and G.c:

Now we can resolve A against itself, since we can simply let be some constant for which . And we can resolve H.a and C.a by letting and :