HW 11

Wednesday, February 22, 2023 11:53 AM

Problem 1.
Consider the following facts, rules, and queries.

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Facts:
  child('Jill','Zed').
  child('Ned','Bea').
  child('Tim','Jack').
  child('Sue','Jack').
  child('Anne','Jill').
  child('Lou','Jane').
  child('Mary','Tim').
  child('Ron','Dan').
  child('Anna','Kim').
  child('Tim','Jill').
  child('Mary','Jane').
  child('Jill','Bea').

Rules:
  ancestor(X,Y) :- child(Y,X).
  ancestor(X,Y) :- child(Y,Z), ancestor(X,Z).

Queries:
  ancestor('Zed','Mary')?
```

a. Write the rules as clauses (disjunctions of literals).

b. Write one formal proof of the query using proof-by-contradiction, instantiation, and resolution. Give a justification for each line in your proof. Each step must be a premise or the result of instantiation or resolution.

a)

a(X,Y) v !c(Y,X)
a(X,Y) v (!c(Y,Z) v !a(X,Z))

Mary -> Tim -> Jill -> Zed

b)

1.	!a(Zed, Mary)	Negate Query
2.	c(Mary, Tim)	Premise / Fact
3.	a(Zed, Mary) v (!c(Mary, Tim) v !a(Zed, Tim))	Instantiation: Rule2
4.	!c(Mary, Tim) v !a(Zed, Tim)	Instantiation: 1,3
5.	c(Tim, Jill)	Premise / Fact
6.	a(Zed, Tim) v (!c(Tim, Jill) v !a(Zed, Jill))	Instantiation: Rule2
7.	!c(Tim, Jill) v !a(Zed, Jill)	Instantiation: 4, 6
8.	c(Jill, Zed)	Premise / Fact
9.	a(Zed,Jill) v !c(Jill,Zed)	Instantiation: Rule1
10.	!c(Jill,Zed)	Resolution: 8,9
11.	**FALSE**	Resolution: 8, 11