Additional Exercises #1:

**Exercize 1:**

**Can you derive the following from (1) to (14) in Example 1.1.1? Justify your answers.**

(a) Barack is a parent of Natasha.

[Fact 4] fatherOf(Barack, Natasha)

[Rule 10] fatherOf(Barack, Natasha) → parentOf(Barack, Natasha)

(b) Craig is an uncle of Malia.

[Fact 5] motherOf(Michelle, Malia)

[Rule 11] motherOf(Michelle, Malia) → parentOf(Michelle, Malia)

[Fact 2] brotherOf(Craig, Michelle)

[Rule 13] brotherOf(Craig, Michelle) ^ parentOf(Michelle, Malia) → uncleOf(Craig, Malia)

(c) Barack is male.

[Fact 4] fatherOf(Barack, Malia)

[Rule 14] fatherOf(Barack, Malia) → male(Barack)

(d) Ann is a grandmother of Malia.

[Fact 3] motherOf(Ann, Barack)

[Fact 4] fatherOf(Barack, Malia)

[Rule 10] fatherOf(Barack, Malia) → parentOf(Barack,Malia)

[Rule 12] motherOf(Ann, Barack) ^ parentOf(Barack, Malia) → grandmotherOf(Ann, Malia)

**Excersize 2**

**Write the following sentences as Datalog rules.**

(a) Every grandfather is male.

grandfather(x, y) → male(x)

(b) If somebody is the child of the brother of some male person, then the latter is the uncle of the

Former.

childOf(x, y) ^ brotherOf(y, z) → uncleOf(z, x)

(c) If somebody is the father of somebody else’s father, then the first person is a grandfather.

fatherOf(x, y) ^ fatherOf(y, z) → grandfatherOf(x, z)

(d) The ancestor of some person’s ancestor is also the first person’s ancestor.

ancestorOf(x, y) ^ ancestor(y, z) → ancestorOf(x, z)

(e) If somebody is the father of a female person, then that female person is the daughter of this

“Somebody”.

fatherOf(x, y) ^ female(y) → daughterOf(y, x)

(f) If a person is the daughter of somebody’s daughter, then this first person is the granddaughter

of this “somebody.”

daughterOf(x, y) ^ daughterOf(y, z) → granddaughterOf(x, z)

**Exercize 3**

**In the context of (1) to (14) of Example 1.1.1, write Datalog rules**

(a) which define what a nephew is

uncleOf(x,y) ^ male(y) → nephew(y)

(b) which define what a cousin is

Cannot do.

(c) what defines what a mother-in-law is

Cannot do.

(d) and which define what a grandson is

uncleOf(x,y) ^ male(y) → nephew(y)

**Exercise 4  
In the context of (1) to (14) of Example 1.1.1,**  
(a) define cousinOf

Cannot do.  
(b) state that cousinOf is symmetric;

Cannot do, because of (a)  
(c) define ancestorOf

???

(d) state that ancestorOf is transitive

ancestorOf(x, y) ^ ancestorOf(y, z) → ancentorOf(x, z)