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

(a) Michelle is a parent of Malia.

(b) Ann is a grandmother of Natasha.

Exercise 2 Write the following sentences as Datalog rules.

(a) Every mother is female.

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

(c) If a person is the daughter of somebody’s daughter, then this first person is the granddaughter of this “somebody.”

Exercise 3 In the context of (1) to (14) of Example 1.1.1, write Datalog rules

(a) which define what an aunt is

(b) and which define what a niece is.

Explain your answers.

Exercise 4 In the context of (1) to (14) of Example 1.1.1,

(a) define siblingOf and

(b) state that siblingOf is symmetric.

Explain your answers.

Exercise 5 A vertex $v$ in a graph is self-connected if there is a path from $v$ to $v$ in the graph. By extending the Datalog facts and rules from Example 1.1.5, complete the datalog rule

$$\cdots \rightarrow \text{sc}(x)$$

such that a vertex $v$ is self-connected if and only if $\text{sc}(v)$ can be derived. Justify your answer.