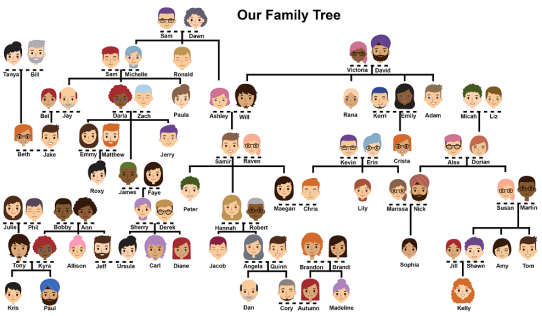
Exercise 1 *Here is a map of the Totman Family tree.*



Use the map to define a new relation.

Definition 1. *The **Sibling** relation includes three sets:*

- *A first set consisting of all family members.*
- *A second set consisting of all family members.*
- *A set of family ordered pairs. The pair (first person, second person) is a member of the Sibling relation if the first person and the second person have the same mother and father.*

Exercise 2 *Is (*  Lily ,  Marissa *) in the Sibling relation?*

Multiple Choice:

(a) *Yes* ✓

(b) *No*

Feedback (attempt): *Both Lily and Marissa have the same mother and father - Erin and Kevin.*

Exercise 3 *Is (*  Marissa ,  Nick *) in the Sibling relation?*

Multiple Choice:

(a) *Yes*

(b) *No* ✓

Feedback (attempt): *Marissa's mother is Erin. Nick's mother is Dorian.*

Exercise 4 *Are both (*  Lily ,  Marissa *) and (*  Marissa ,  Lily *) in the Sibling relation?*

Multiple Choice:

(a) *Yes* ✓

(b) *No*

Feedback (attempt): *Lily and Marissa have the same mother and father.*

Exercise 5 *If (person1, person2) is in the Sibling relation, then is (person2, person1) always in Sibling?*

Multiple Choice:

(a) *Yes* ✓

(b) *No*

Feedback (attempt): *Both person1 and person2 are in the first and second set, since both sets consists of all family members. If (person1, person2) is in Sibling, then person1 and person2 have the same mother and father. That is the criteria for (person2, person1) to be in Sibling.*

Exercise 6 *Is Sibling symmetric?*

Multiple Choice:

(a) *Yes* ✓

(b) *No*

Feedback (attempt): *If (person1, person2) is in Sibling, then (person2, person1) is in Sibling.*

Exercise 7 *Is Sibling transitive?*

Multiple Choice:

(a) *Yes* ✓

(b) *No*

Feedback (attempt): *If (person1, person2) is in Sibling and (person2, person3) is in Sibling, then person1, person2, and person3 all have the same mother and father. Therefore, (person1, person3) is in Sibling.*

Exercise 8 *Is Sibling reflexive?*

Multiple Choice:

(a) *Yes* ✓

(b) *No*

Feedback (attempt): *person1 has the same mother and father as person1. That is all that is required. Therefore, (person1, person1) is in Sibling. Sibling is reflexive.*

Exercise 9 *How many solutions are there to the following statement?*

(, *PERSON)* $\in$ *Sibling*

$\boxed{4}$

Feedback (attempt): *Will, Rana, Adam, and Emily*