Relations – Properties & Examples

Suppose $C = C_1 \cup C_2$ where

C_1 = {all the children of Amy and Bob} = {Carl ( ), Dick ( ), Ellen ( ), Frank( ), Ginger( )}

C_2 = {all the children of Helen and Ivan} = {Jane( ), Ken( )}

We define the relations B and S on C $\times$ C as follows:

x B y iff x $\neq$ y and x is the brother of y

x S y iff x and y have the same pair of parents

1. Place an "x" in the cell in row p, column q if p B q.

B	Carl	Dick	Ellen	Frank	Ginger	Jane	Ken
Carl							
Dick							
Ellen							
Frank							
Ginger							
Jane							
Ken							

2. Place an "x" in the cell in row p, column q if p S q.

S	Carl	Dick	Ellen	Frank	Ginger	Jane	Ken
Carl							
Dick							
Ellen							
Frank							
Ginger							
Jane							
Ken							

3. Determine the truth-value of each statement.

a. $\exists c_1 \in C$, c_1 B c_1

b. $\forall c_1, c_2 \in C$, if c_1 B c_2 then c_2 B c_1

c. $\forall c_1, c_2, c_3 \in C$, if c_1 B c_2 and c_2 B c_3, then c_1 B c_3.

d. $\exists c_1 \in C$, c_1 S c_1

e. $\forall c_1, c_2 \in C$, if c_1 S c_2 then c_2 S c_1

f. $\forall c_1, c_2, c_3 \in C$, if c_1 S c_2 and c_2 S c_3, then c_1 S c_3.

4. a.   List the elements in {q $\in$ C : Carl S q }.

b.   List the elements in {q $\in$ C : Jane S q }.