Foundations of Computer Science (COMP109)

Tutorial VII (bring solutions between 13.11.2017 – 17.11.2017)

VII.1. Let $A = \{1, 2, 3\}$ and $B = \{a, b\}$. Determine the set $A \times B$.

VII.2. Let A be a set. Determine the set $A \times \emptyset$.

VII.3. Which ordered pairs are in the relation $R = \{(x, y) \mid x > y\}$ on the set $A = \{1, 2, 3, 4\}$?

VII.4. List all the binary relations on the set $\{0, 1\}$.

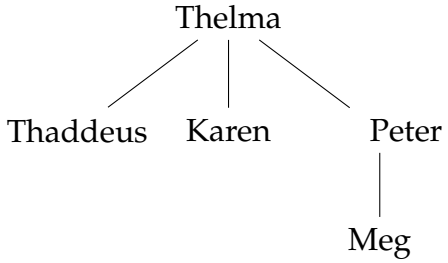
VII.5. List the set of ordered pairs and draw the graphical representation of the relation R between $\{1, 2, 3, 4\}$ and $\{a, b, c\}$ with the matrix:

$$M = \begin{bmatrix} T & F & F \\ F & F & T \\ F & T & F \\ T & F & F \end{bmatrix}$$

VII.6. Let R be the relation on $\{1, 2, 3, 4\}$ given by xRy if, and only if, $x - y = 0$. Represent R in the following ways:

- as a set of ordered pairs;
- in graphical form;
- in matrix form.

VII.7. Consider the family tree



Let $A = \{$Thelma, Thaddeus, Karen, Peter, Meg$\}$ be the set of all family members and $B = \{$Thaddeus, Peter$\}$ be the set of male members.

Let R be the relation between the sets A and B consisting of pairs (a, b), where a is a parent of b. Let S be the relation between sets B and A consisting of pairs (a, b), where a and b are siblings (brothers or sisters).

- Represent relations R and S in the matrix form.
- Use the matrix forms to compute $R \circ S$ and $S \circ R$.