Dr. Christian Săcărea

"Babeş–Bolyai" University of Cluj-Napoca
Department of Computer Science

Exercise sheet Nr. 1

Knowledge Discovery in Wide Area Networks

Organization
hands-on exercise means

- *autonomous work* on the practice sheet in small teams of 3-4 students, under supervision
- *no general repetition* of lecture material
- *no demonstration* of the sample solution (will be provided later)

necessary for that is

- making notes during the lecture
- performing autonomous follow-up course work before the exercise
- bringing material and your notes to the exercise
- developing own activity

Why this exercise concept?

- active development of the lecture material is more effective
- discovering relationships in the material
- learning structured thinking and autonomous working
- learning team work
- learning to explain things
- exercise for the exams ;-)
- *You have finished your study of . . . Your personal strengths include pro-activity and team work, you are communicative and willing to cooperate.* (typical job advertisement)

GROUPWORK:

(G 1)

Regard the following formal context K, given as a cross table:

	needs water to live	lives in water	lives on land	needs chlorophyll to produce food	two seed leaves	one seed leaf	can move around	has limbs	suckles its offspring
Leech	x	x					x		
Bream	x	x					x	x	
Frog	x	x	x				x	x	x
Spike-Weed	x	x		x		x			
Reed	x	x	x	x		x			
Bean	x		x	x	x				
Maize	x		x	x		x			

a) Specify the following sets:
   1. $\{Bean\}'$
   2. $\{lives\ on\ land\}'$
   3. $\{two\ seed\ leaves\}''$
   4. $\{Frog, Maize\}'$
   5. $\{needs\ chlorophyll\ to\ produce food, can\ move\ around\}'$
   6. $\{lives\ in\ water, lives\ on\ land\}'$
   7. $\{needs\ chlorophyll\ to\ produce food, can\ move\ around\}'$

b) Extend $\mathbb{K}$ with both an object and an attribute.

(G 2)

Consider the formal contexts from Lecture 1. Use `ConExp` and `FCA Tools Bundle` to determine the set of concepts and to draw the concept lattices.

(G 3)

a) Recall: how is the derivation operator $(\cdot)'$ defined?

b) Let $\mathbb{K} = (G, M, I)$ be a formal context and let $A, B \subseteq G$. Prove the following statements:
   1. $A \subseteq B$ implies $B' \subseteq A'$
   2. $A \subseteq A''$
   3. $A' = A'''$
   4. For $C \subseteq G$ and $D \subseteq M$ holds: (C, D) is a formal concept if and only if there is some $E \subseteq G$such that $C = E''$ and $D = E'$.