

Web Semantics – Exercises session 3

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1 Formal Concepts

1. Fill in table 1: whenever a property stated as attribute is true for the object number, draw a \times .
2. Concept forming operators:
 - (a) Compute $\{4\}^\uparrow$ and $\{9\}^\uparrow$.
 - (b) Compute $\{3, 7\}^\uparrow$.
 - (c) Compute $\{p\}^\downarrow$.
 - (d) Compute $\{c, s\}^\downarrow$.
3. Find all the formal concepts that can be derived from the formal context represented by table 1.
4. Order the formal concepts found in the previous question.
5. Draw the corresponding concept lattice.

	Composite (c)	Even (e)	Odd (o)	Prime (p)	Square (s)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Table 1: Properties of numbers from 1 to 10.

2 Many-valued context

1. Draw a table representing a one-valued formal context equivalent to the many-valued formal context represented in table 2.
2. Concept forming operators:
 - (a) Compute $\{Amir\}^\uparrow$ and $\{Diana\}^\uparrow$.
 - (b) Compute $\{Charlie, Estelle\}^\uparrow$.
3. Find all the formal concepts that can be derived from this formal context.
4. Order the formal concepts found in the previous question.
5. Draw the corresponding concept lattice.

	English	French
Amir	C2	C2
Boris	A2	A2
Charlie	A2	C2
Diana	C2	A2
Estelle	A2	C2

Table 2: Students and their language levels.

3 Subsumption

Which of the following statements is true?

1. $A \sqcap \neg A$ is subsumed by B
2. B is subsumed by $A \sqcup \neg A$
3. $A \sqcap \exists r.B$ is subsumed by $A \sqcap \exists r.\top$
4. $A \sqcap \exists r.(B \sqcap C)$ is subsumed by $A \sqcap \exists r.B$
5. $A \sqcap \exists r.(B \sqcup C)$ is subsumed by $A \sqcap \exists r.B$
6. $A \sqcap \forall r.B$ is subsumed by $A \sqcap \exists r.B$
7. $A \sqcap \exists r.B$ is subsumed by $A \sqcap \forall r.B$
8. $A \sqcap \exists r.A \sqcap \forall r.B$ is subsumed by $A \sqcap \exists r.B$