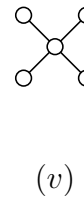
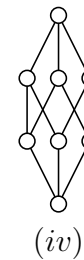
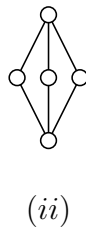
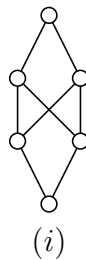


Formal Concept Analysis
Exercise Sheet 2, Winter Semester 2014/15

1 Lattice Theory

Exercise 1 (line diagram)

- a) Define: What is a lattice?
- b) Find a preferably small lattice and draw its line diagram.
- c) Which of the following line diagrams is not a lattice? Why?



Exercise 2 (complete lattice)

- a) Define: What is a complete lattice?
- b) Can you find a *complete* lattice among the lattices of Exercise 1c?
- c) Let $P := (M, \leq)$ be an ordered set such that for every subset X of M the infimum $\bigwedge X$ exists. Show that P is a complete lattice.

Exercise 3

Prove the following theorem:

Let (L, \leq) be a lattice with supremum and infimum defined as usual. For any elements $x, y, z \in L$ holds:

- | | |
|---|--|
| (i) $x \wedge y = y \wedge x$ | (ii) $x \vee y = y \vee x$ |
| (iii) $x \wedge (y \wedge z) = (x \wedge y) \wedge z$ | (iv) $x \vee (y \vee z) = (x \vee y) \vee z$ |
| (v) $x \wedge (x \vee y) = x$ | (vi) $x \vee (x \wedge y) = x$ |
| (vii) $x \wedge x = x$ | (viii) $x \vee x = x$ |

Exercise 4 (the first formal concepts)

Compute all formal concepts of the formal context shown in Table 1.

Tabelle 1: Grobian Gans: *Die Ducks. Psychogramm einer Sippe*. Rowohlt, Reinbek bei Hamburg 1972, ISBN 3-499-11481-X

	generation			sex		financial status		
	older	middle	younger	male	female	rich	carefree	indebted
Tick			×	×			×	
Trick			×	×			×	
Track			×	×			×	
Donald		×		×				×
Daisy		×			×		×	
Gustav		×		×			×	
Dagobert	×			×		×		
Annette	×				×		×	
Primus v. Quack	×			×			×	