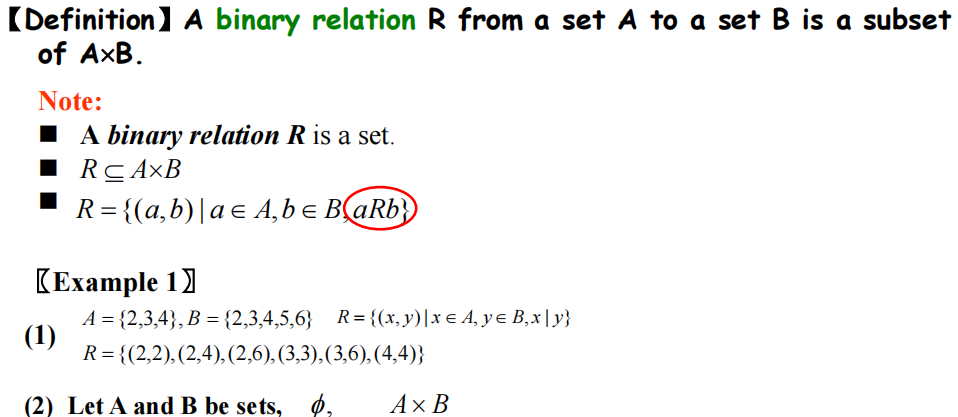
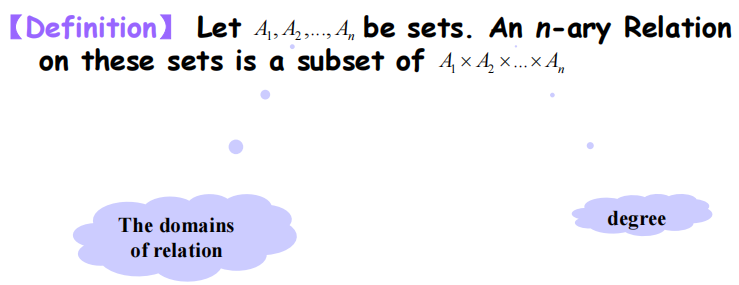
**Chapter 9 Relations**

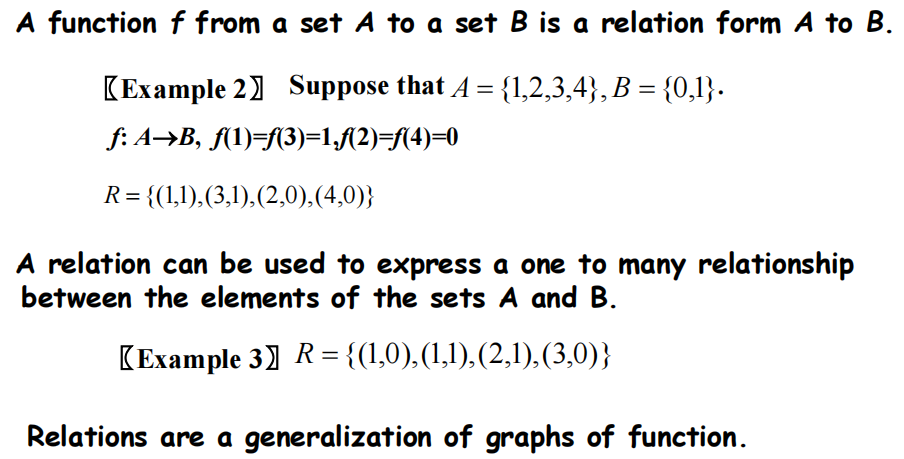
**（9.1） Relations and Their Properties**

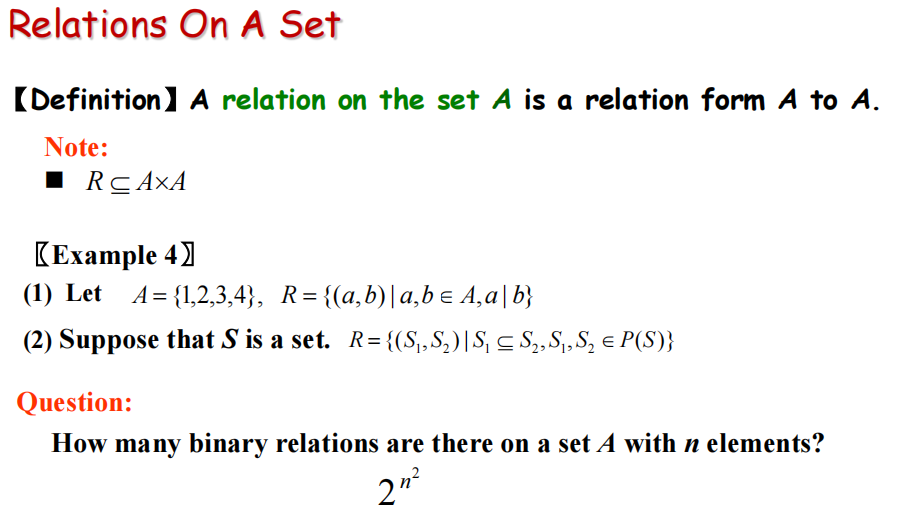
Binary relation（二元关系）

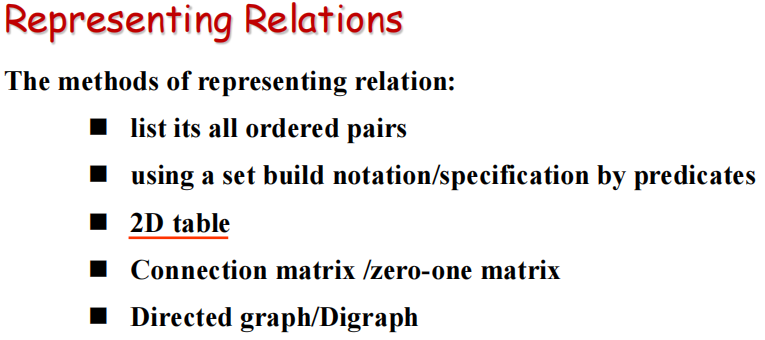


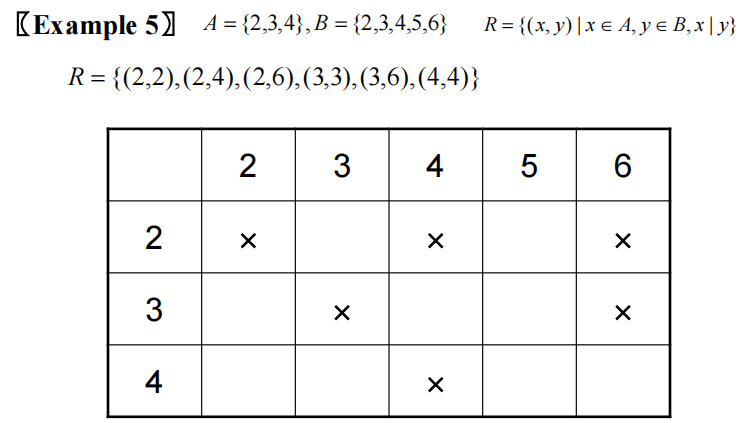
n-ary Relations（n元关系）

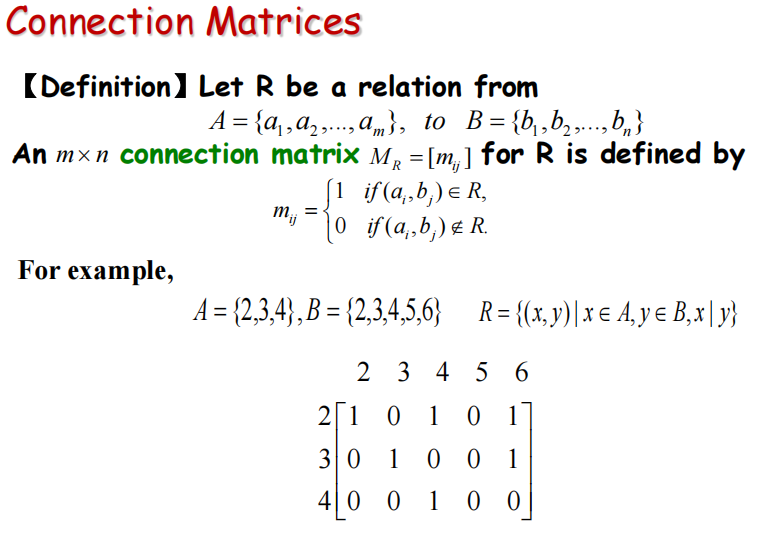


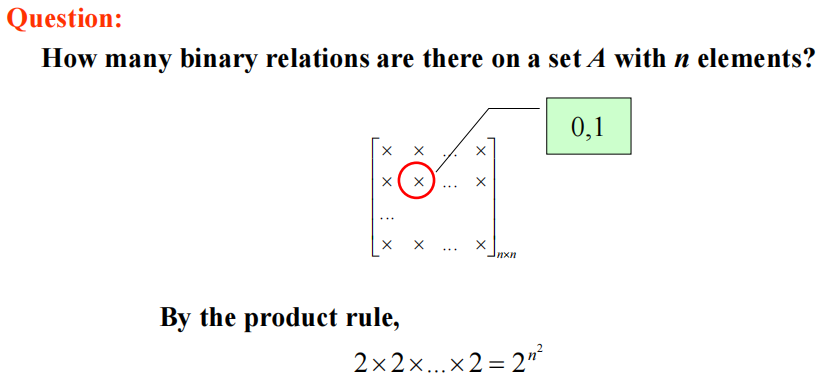








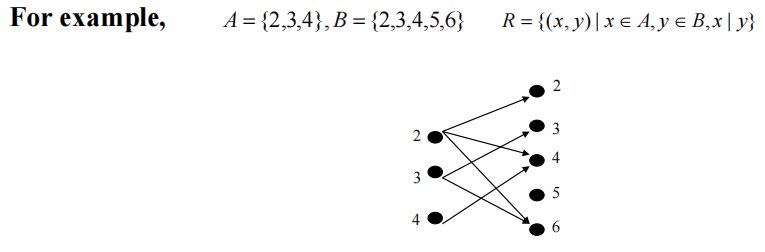


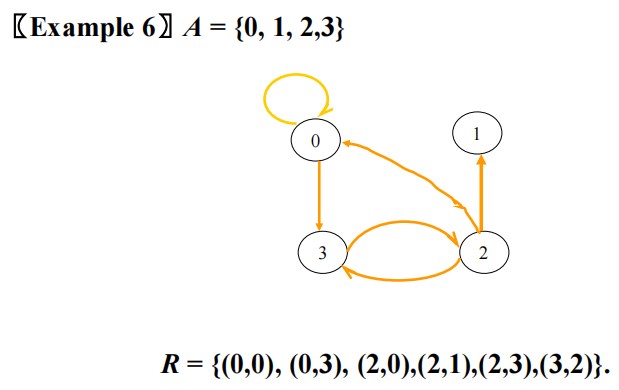


Directed graph/Digraph（有向图）

**【Definition】A directed graph or a digraph, consists of a set V of vertices（顶点） together with a set E of ordered pairs of elements of V called edges(or arcs)（边或弧）.**

**The vertices a,b is called the initial and terminal vertices of the edge (a,b).**





Properties of Binary Relations

 **Reflexive （自反）**

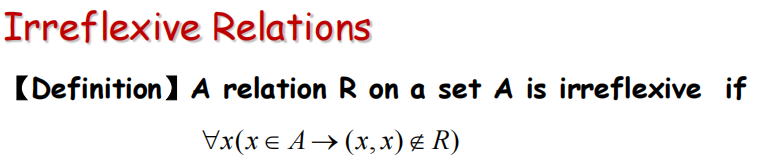
 **Irreflexive （反自反）**

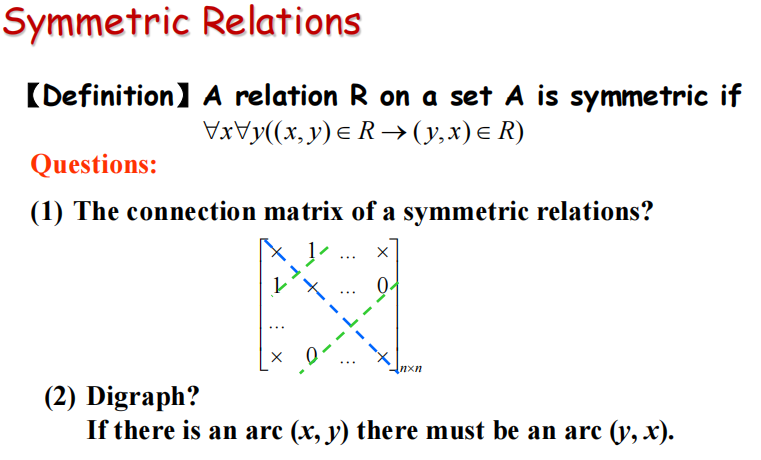
 **Symmetric （对称）**

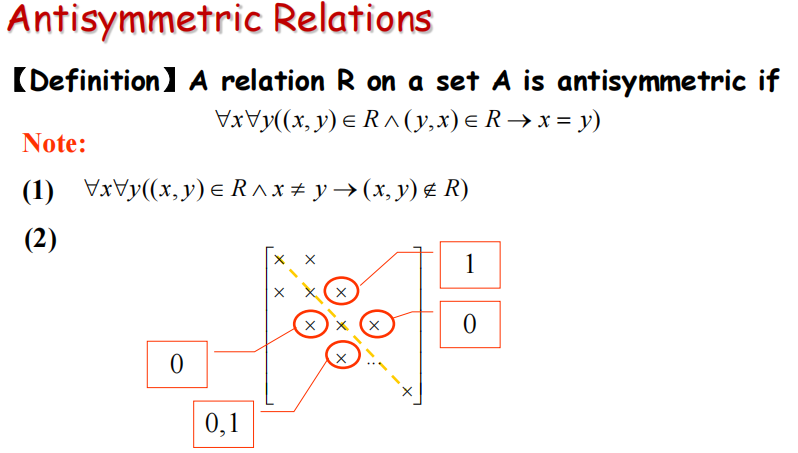
 **Antisymmetric （反对称）**

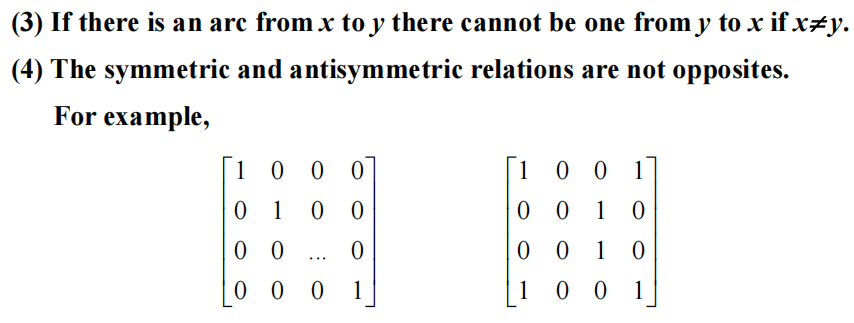
 **Transitive （传递）**

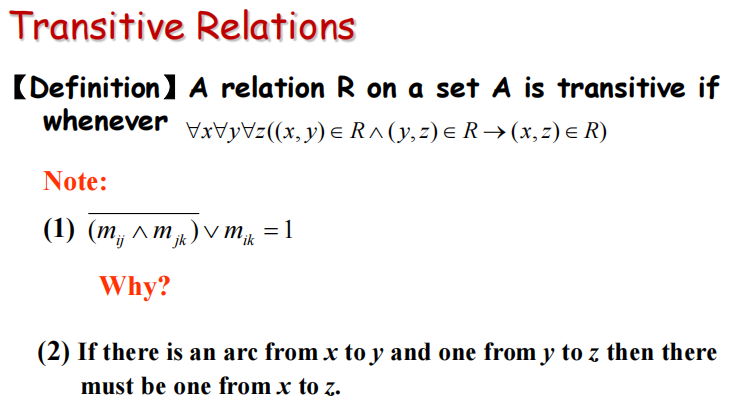


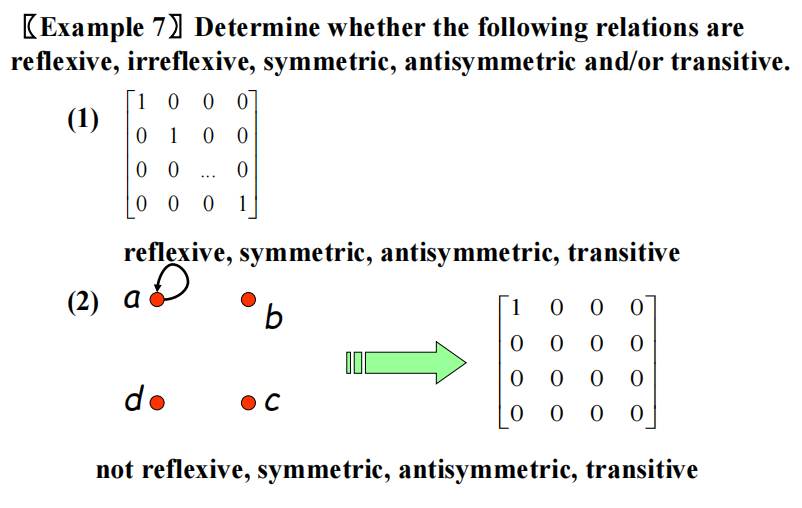


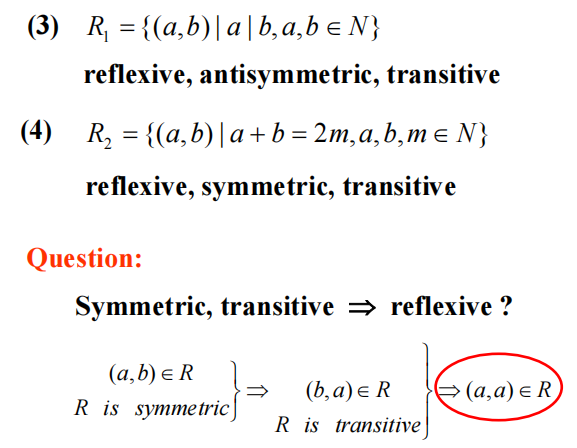




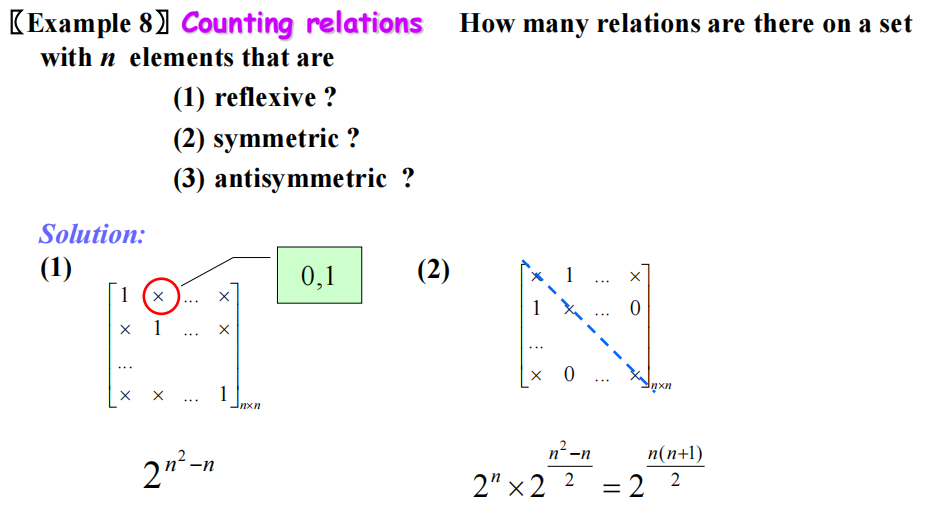


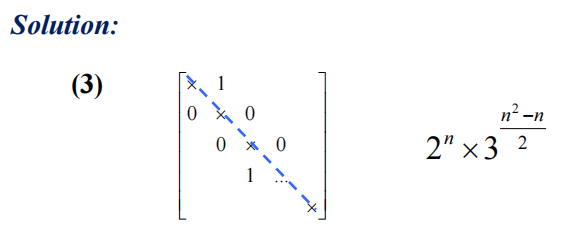


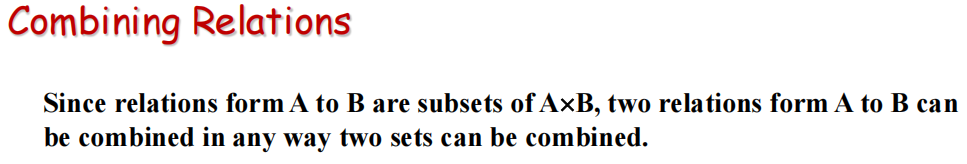




ANSWER: Wrong!（0,0）是个反例

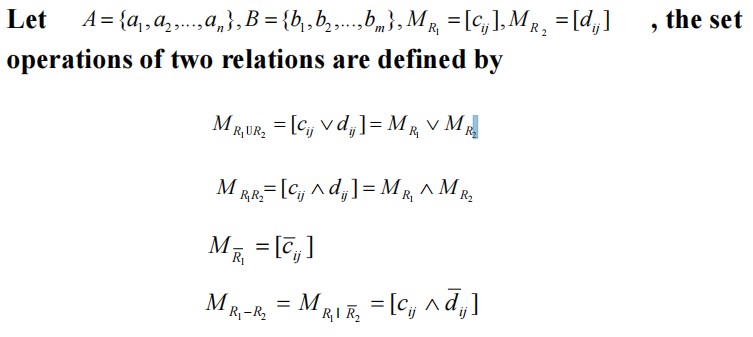




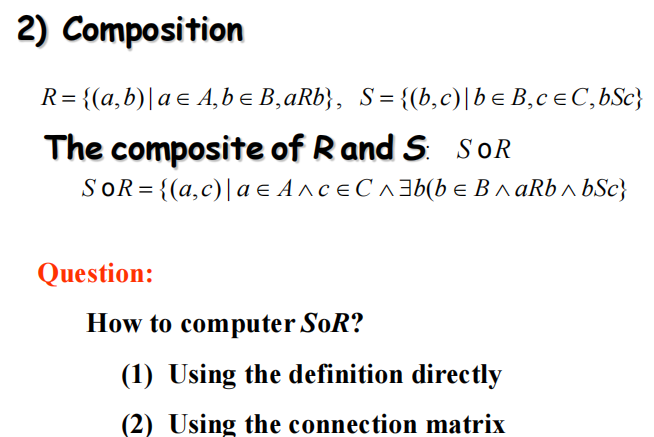


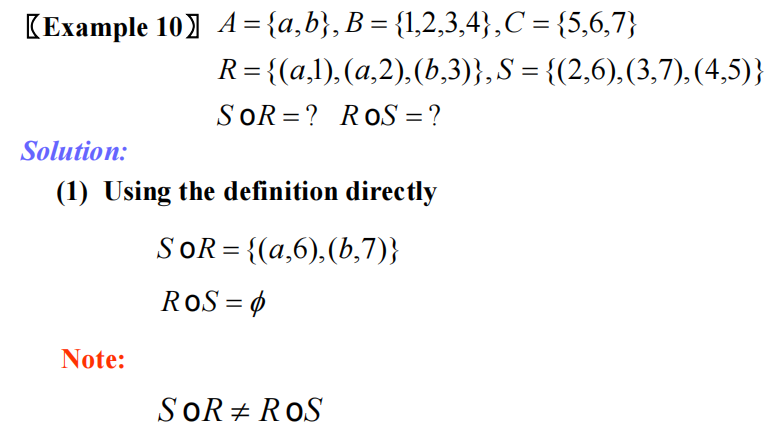


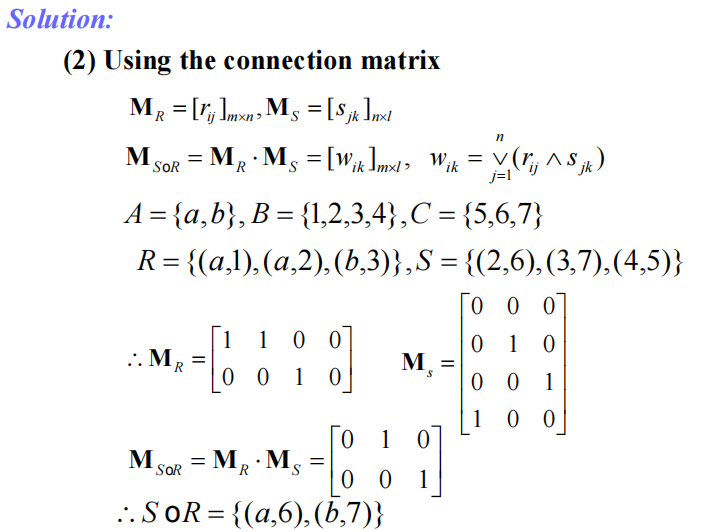
The logical operations of matrices（矩阵的逻辑运算）

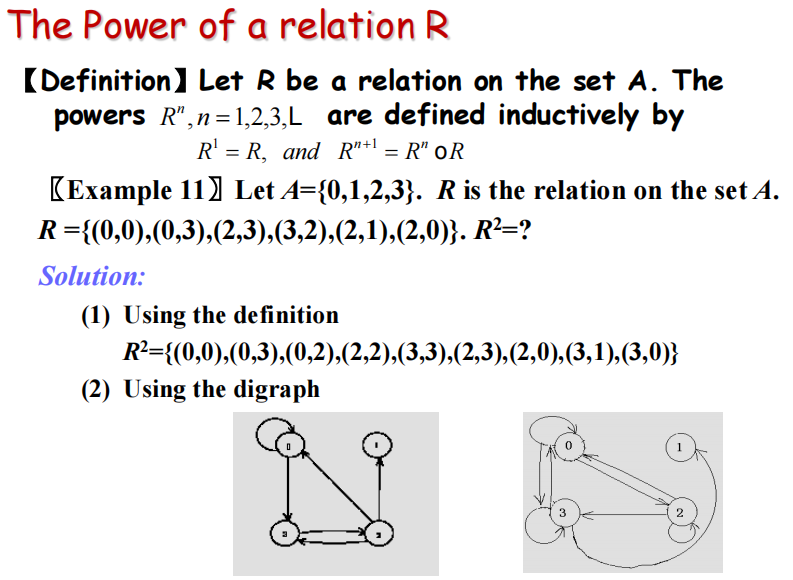


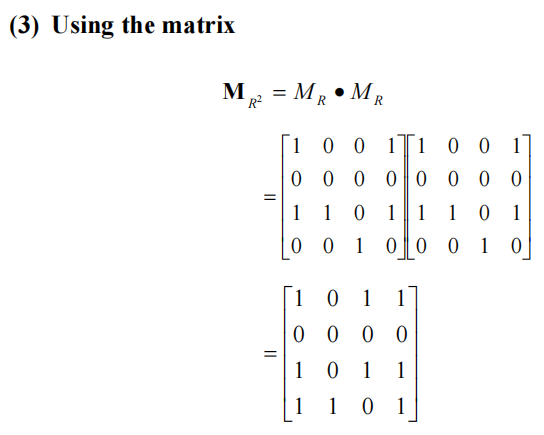
纠错：上面最后一行中间那个是交，不是|

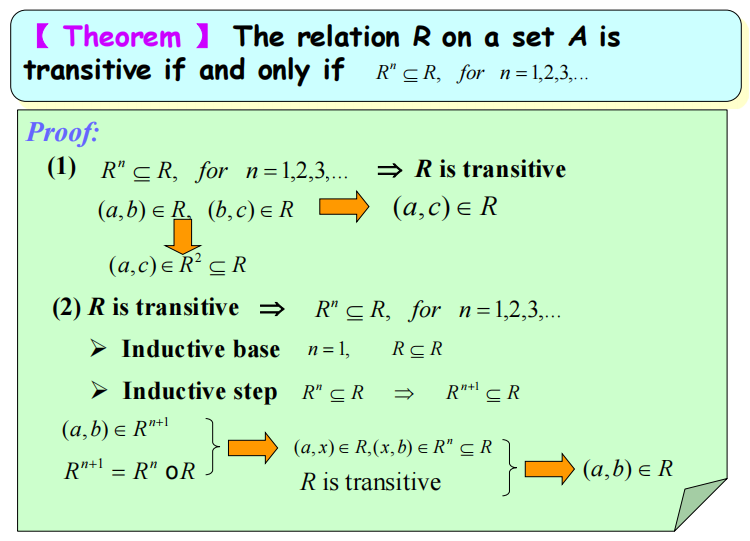


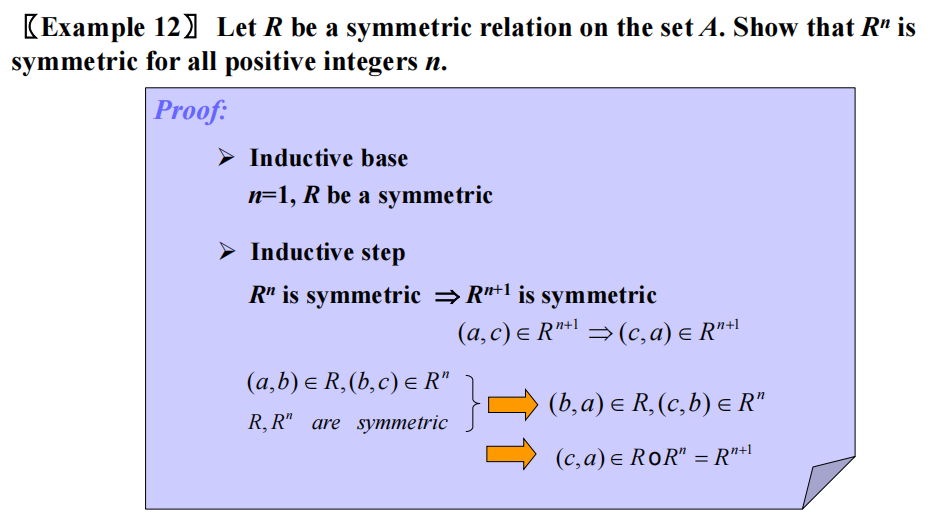


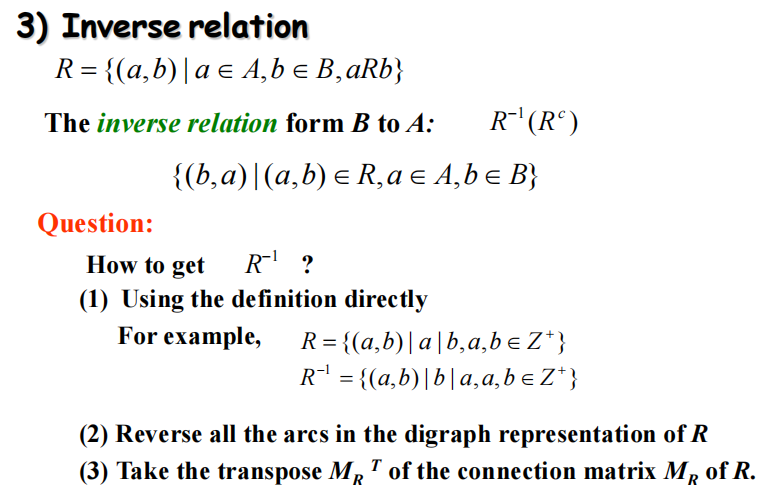


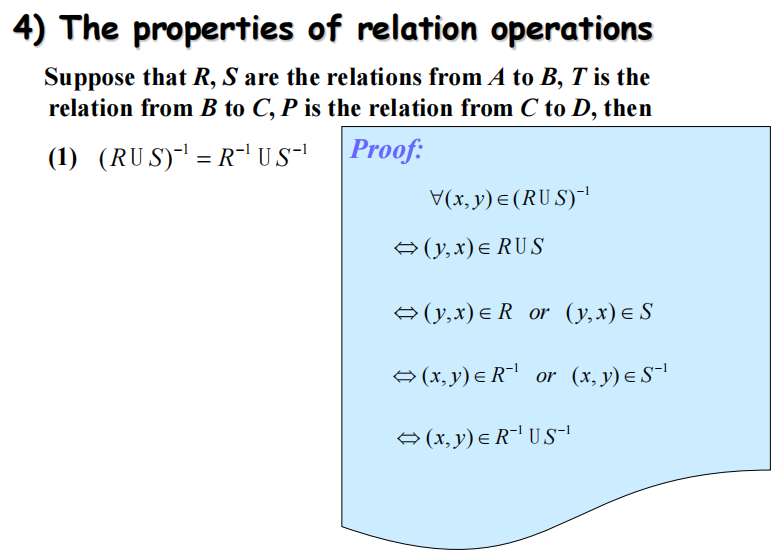


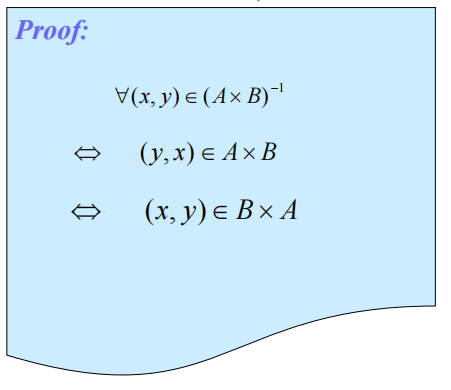
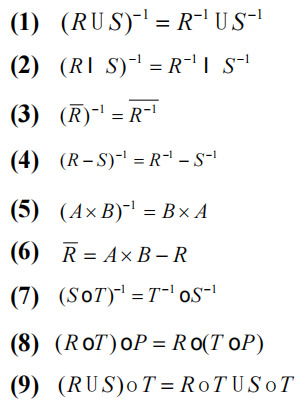




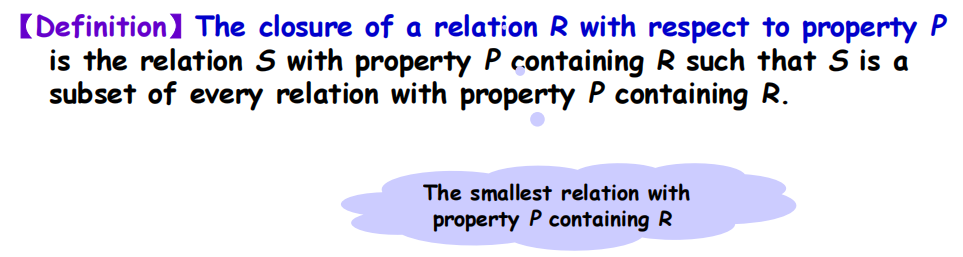


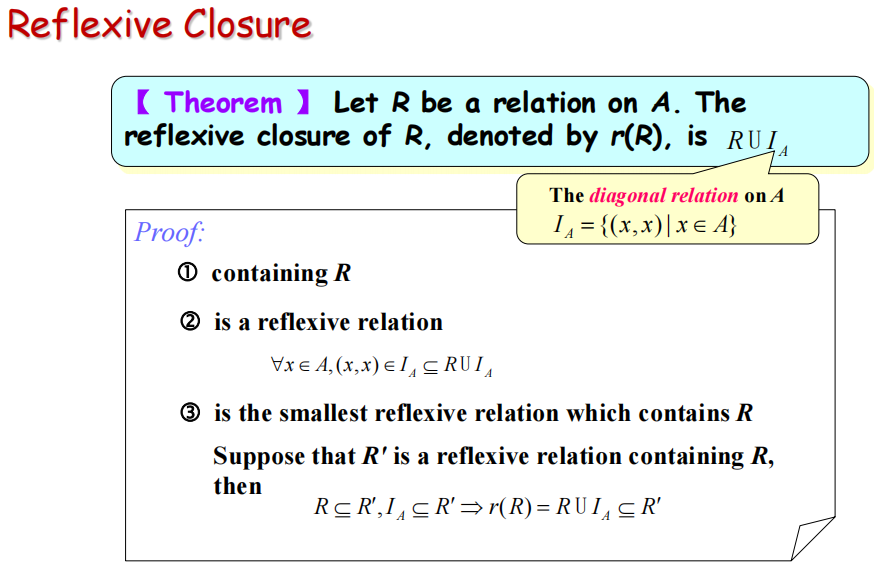


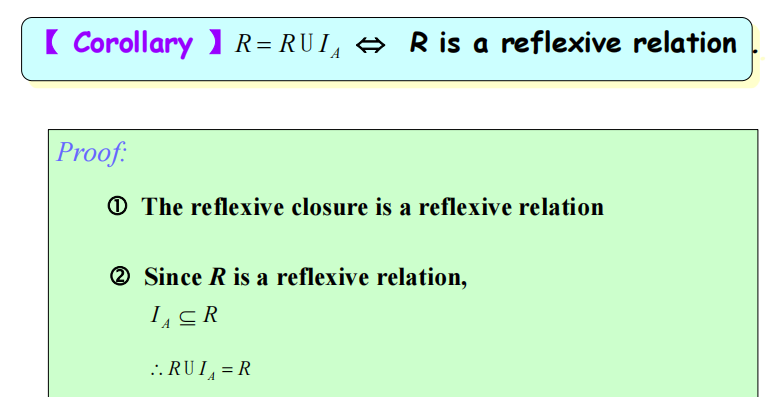


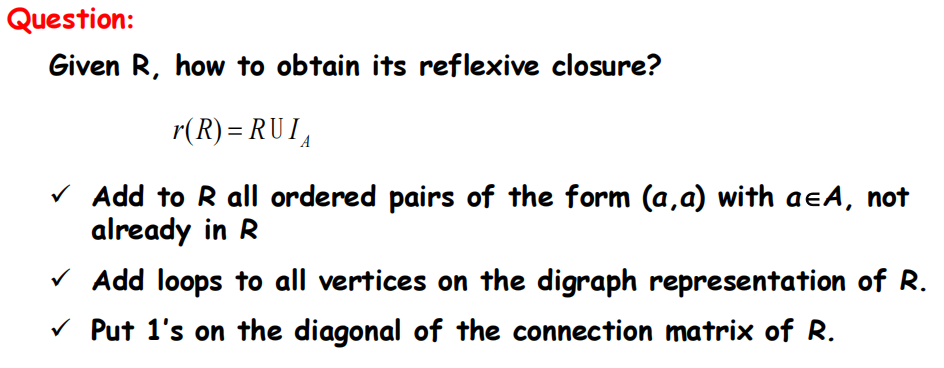


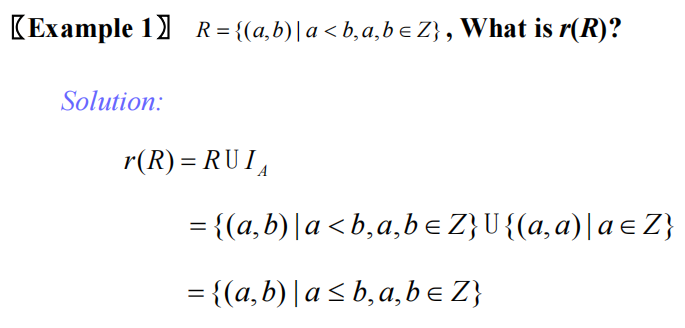
**（9.4）Closures of Relations（关系的闭包）**

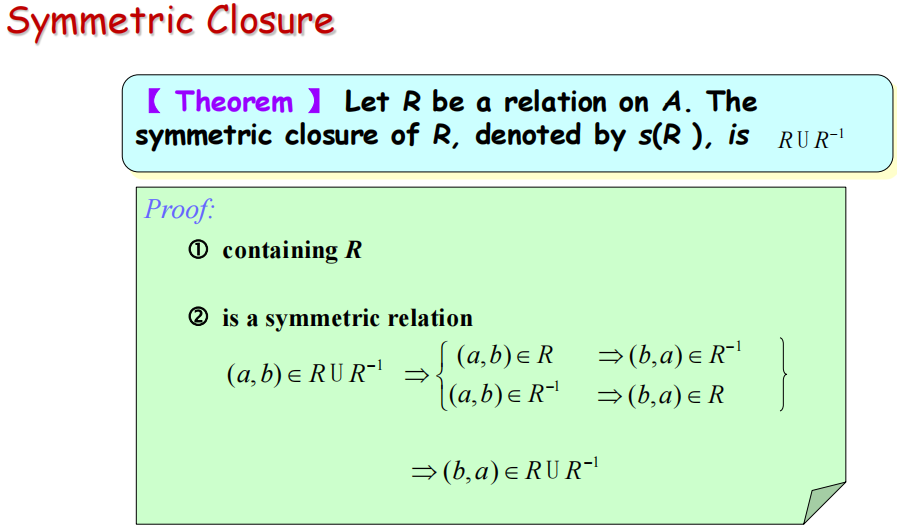


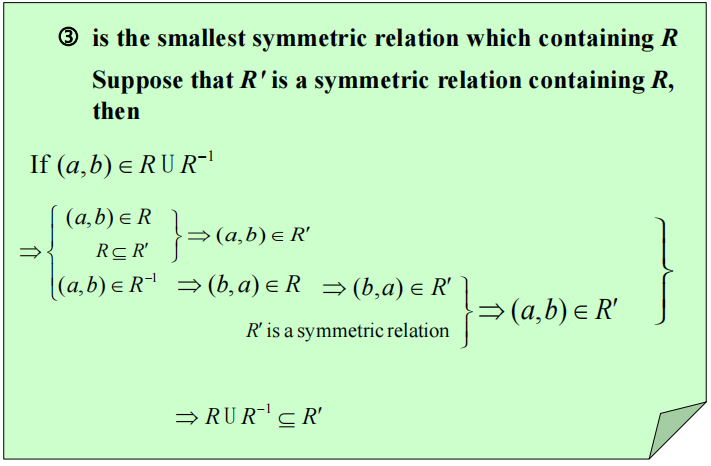


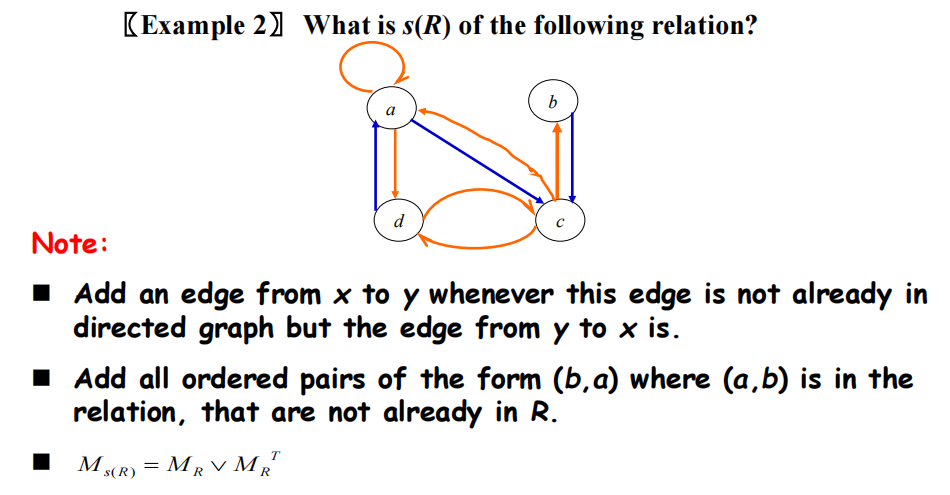


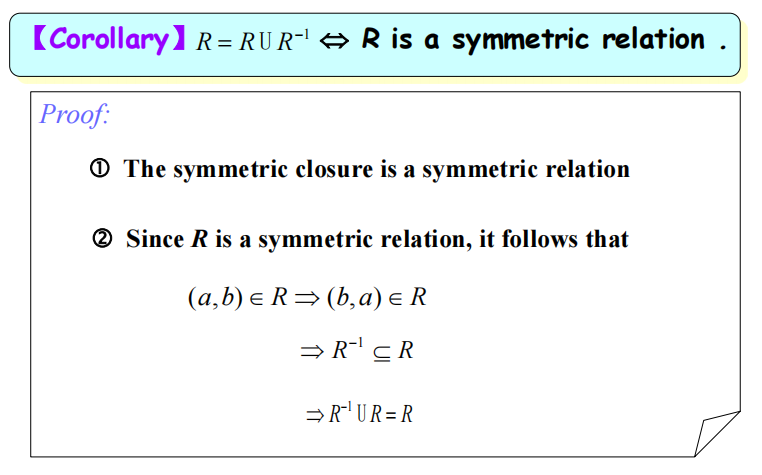


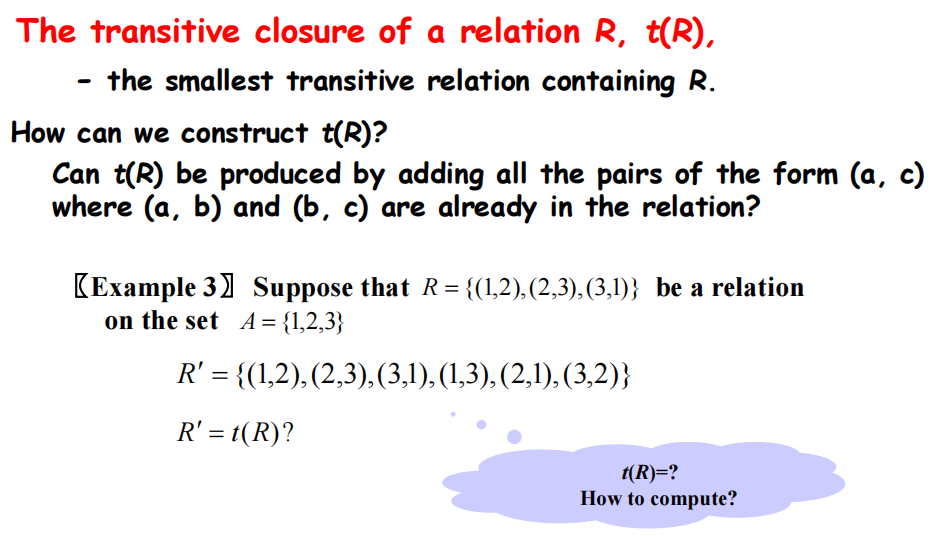




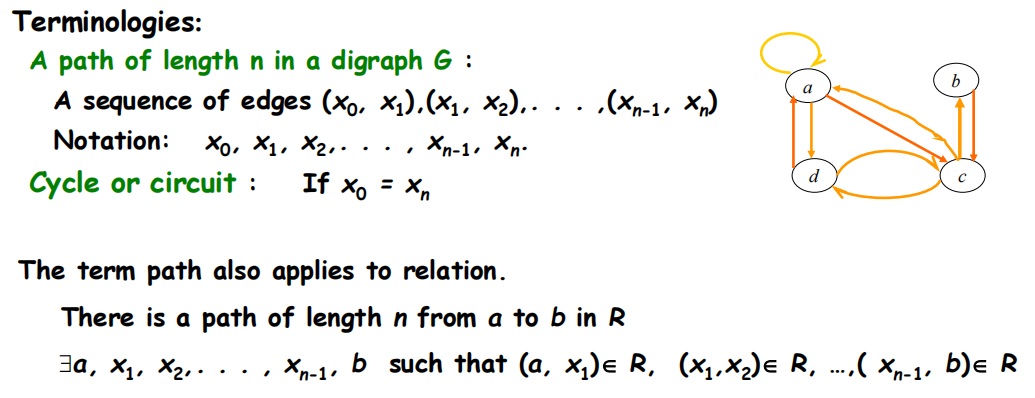


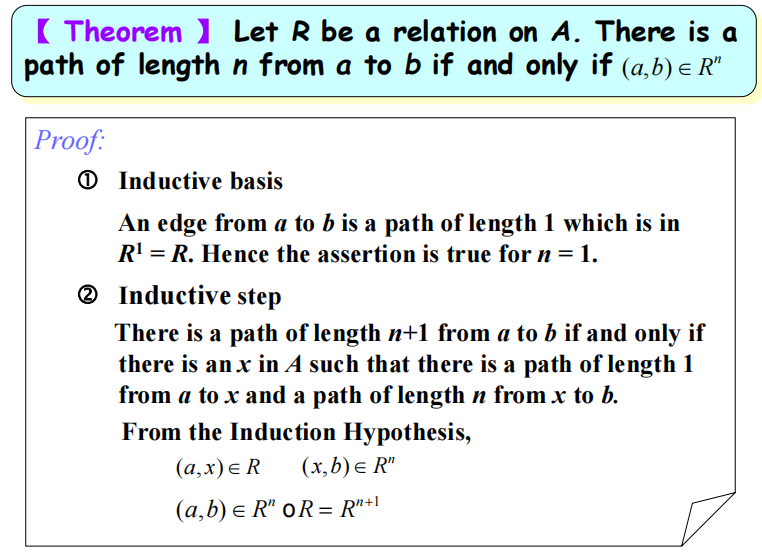


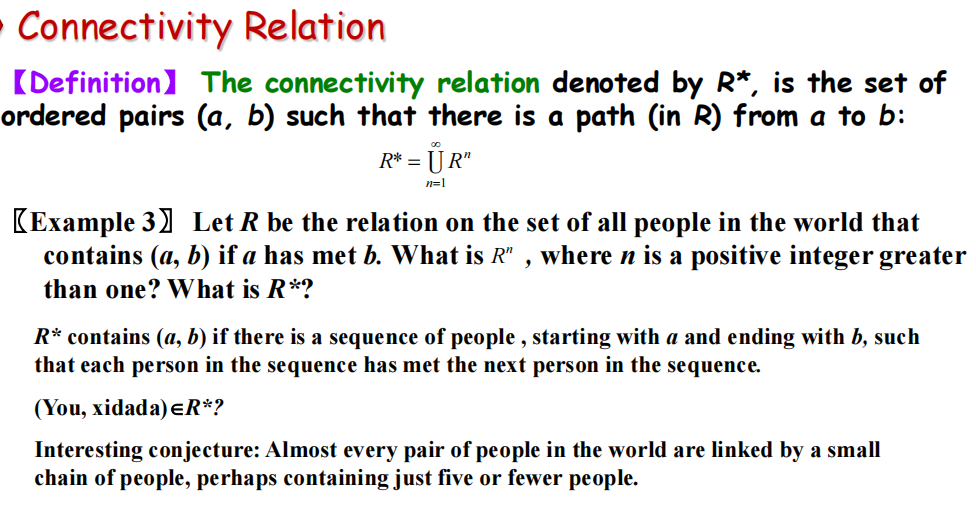


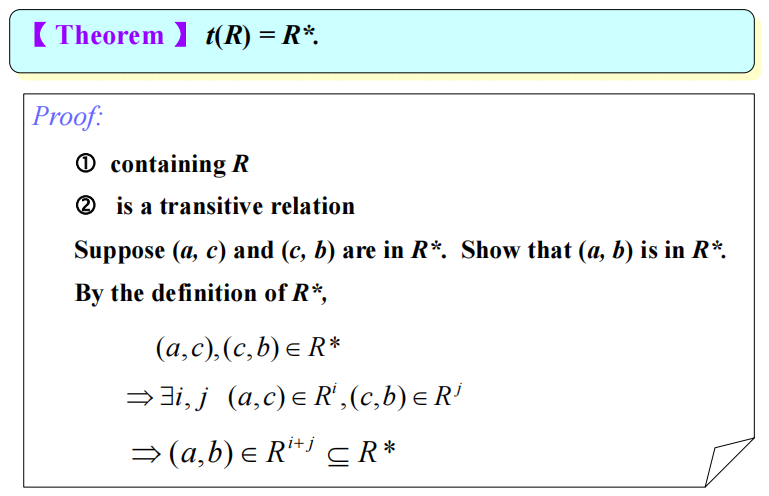


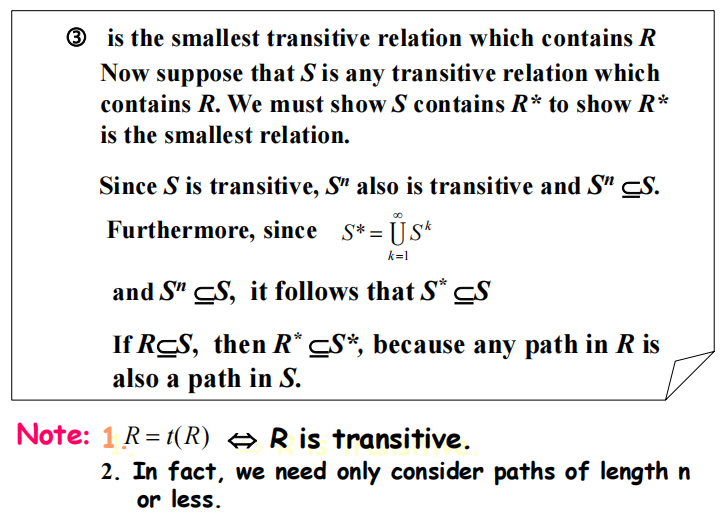
R’不等于t（R）!

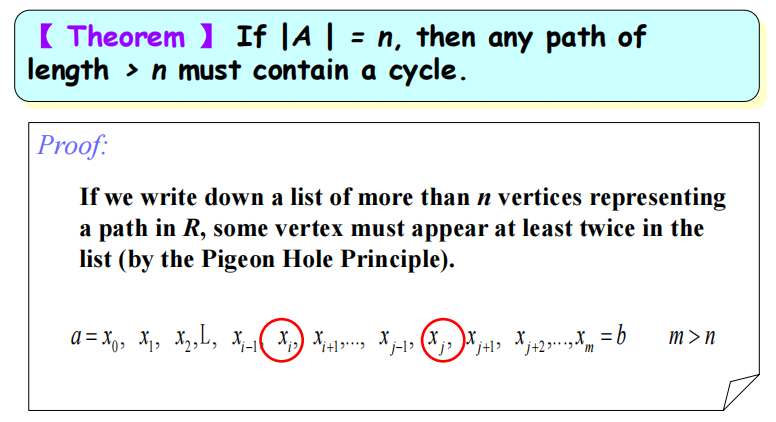


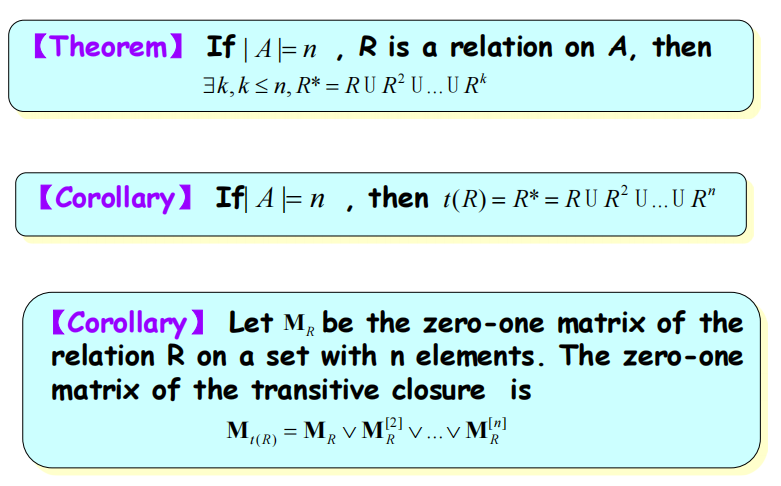


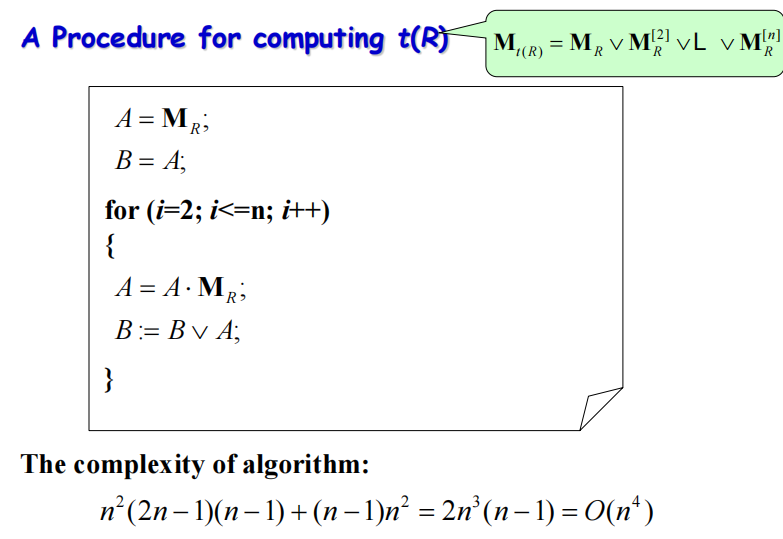


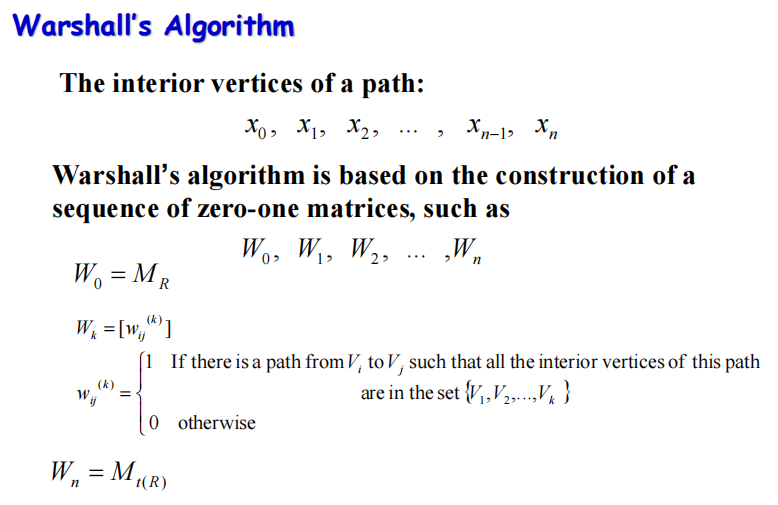




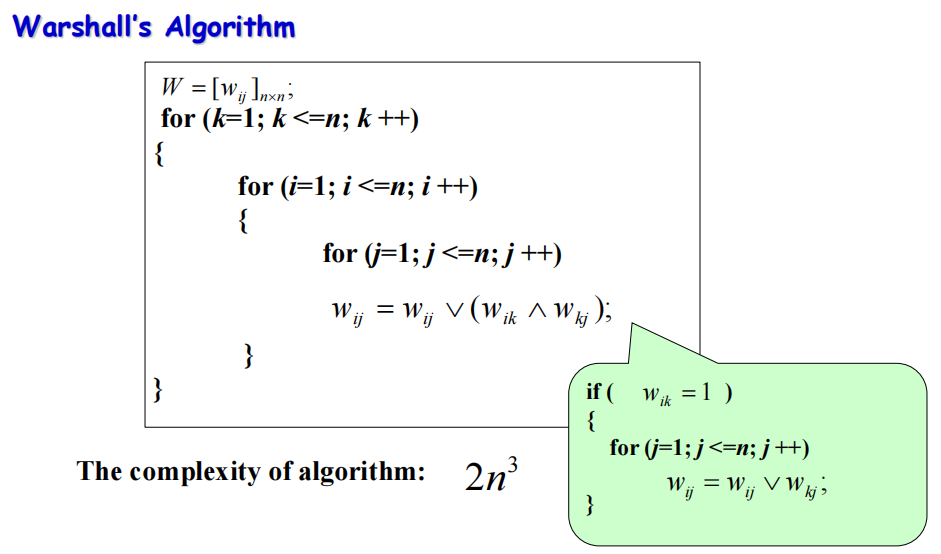




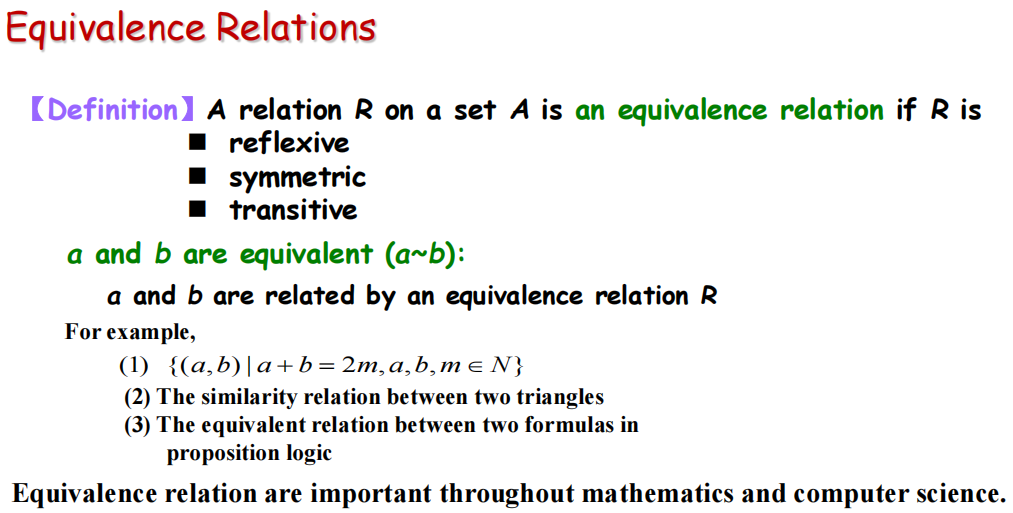


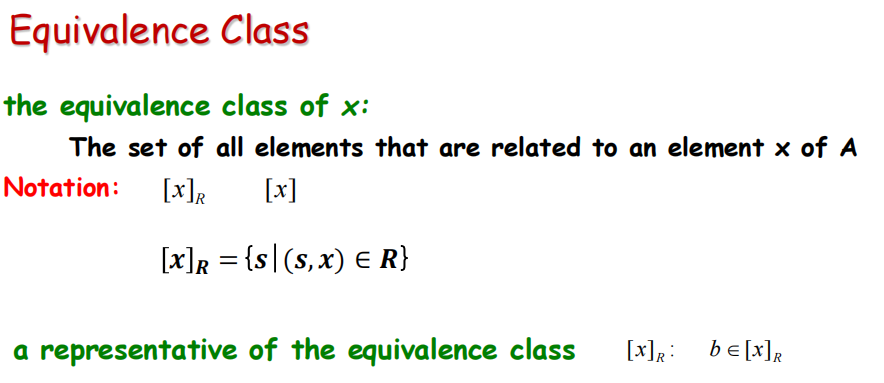


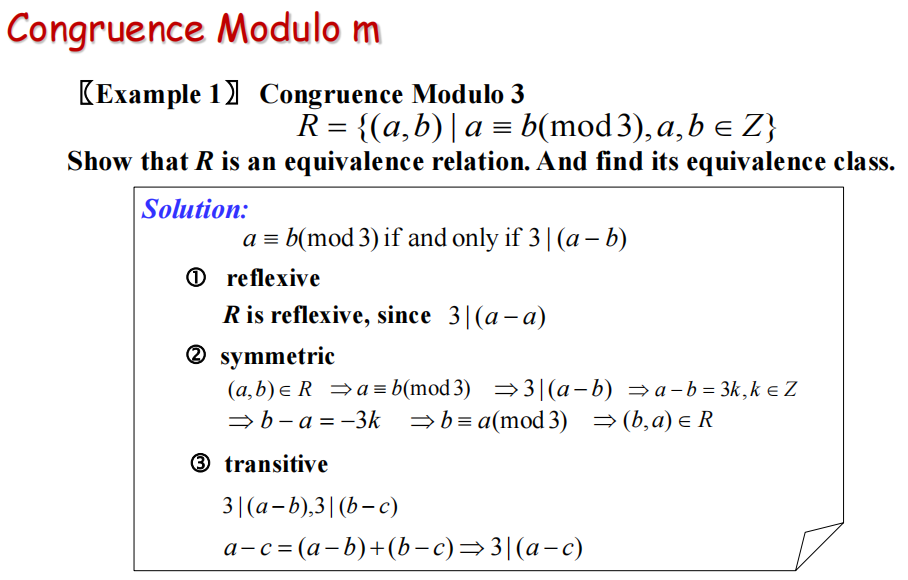


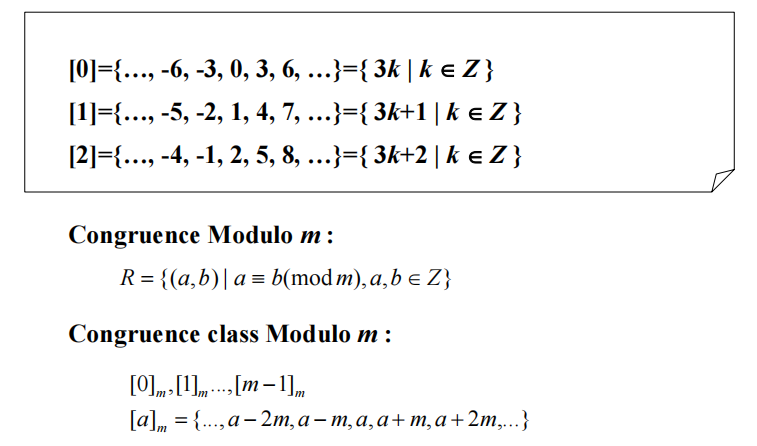


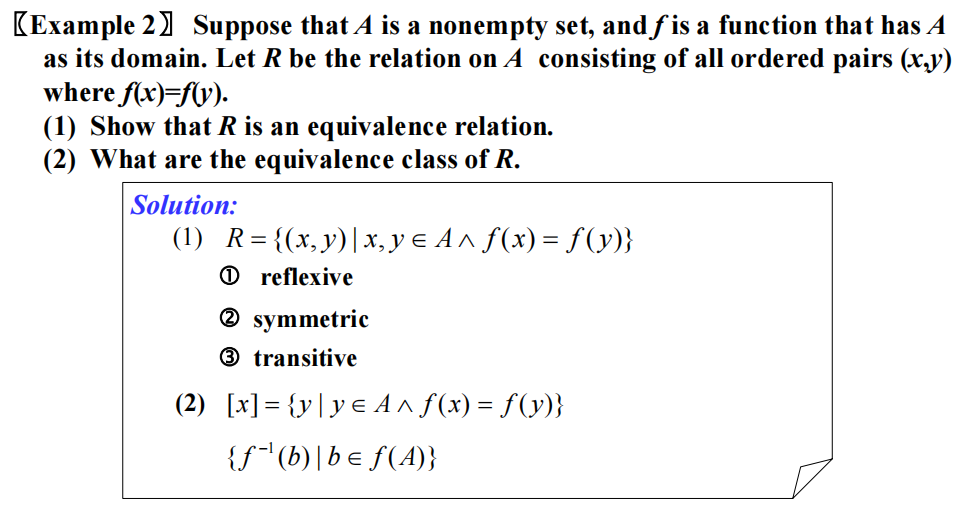
（9.5）**Equivalence Relations**

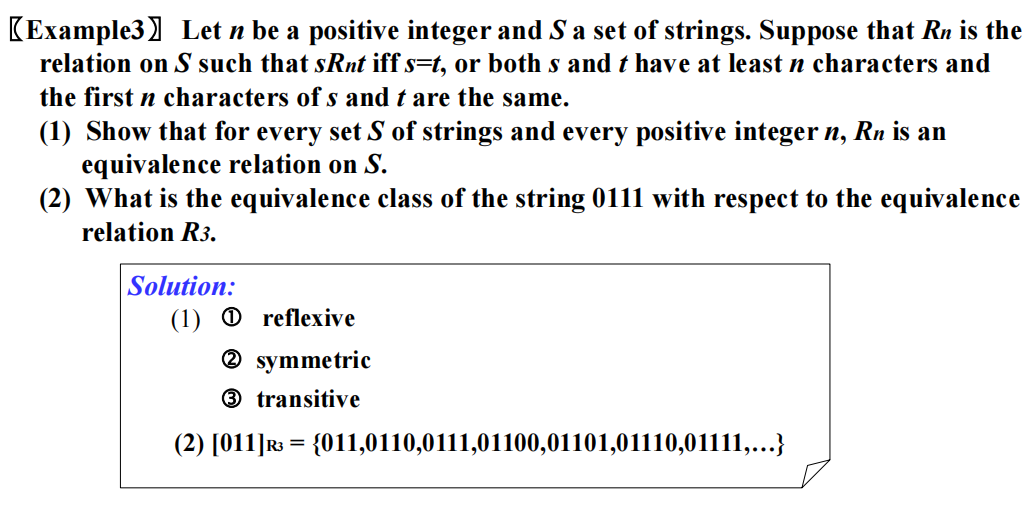


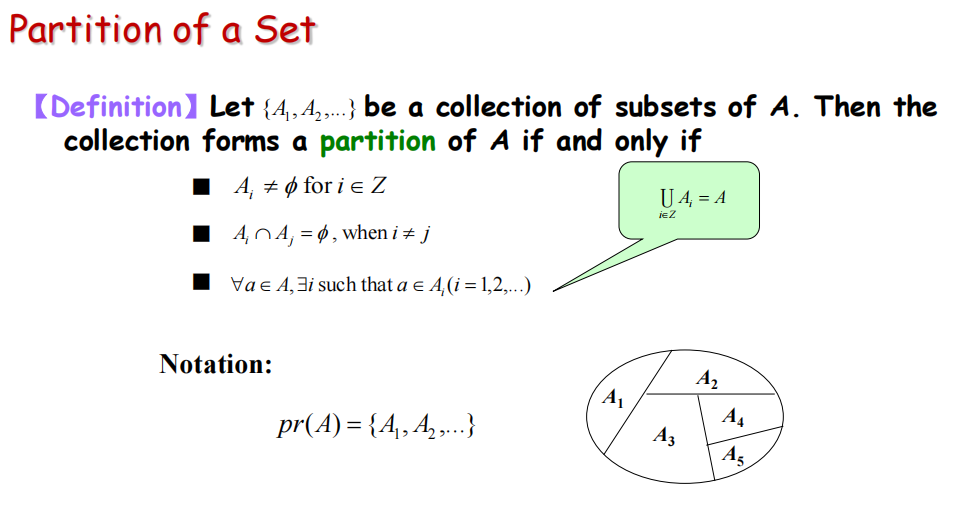


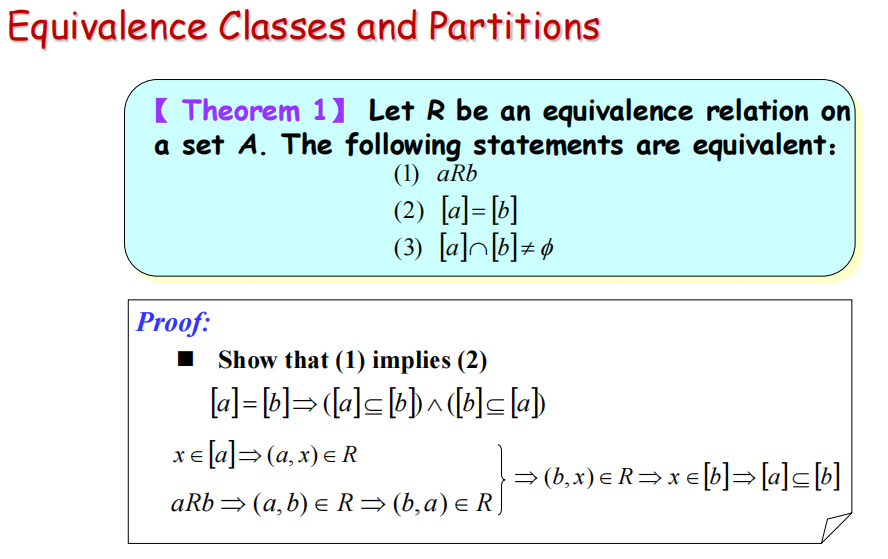


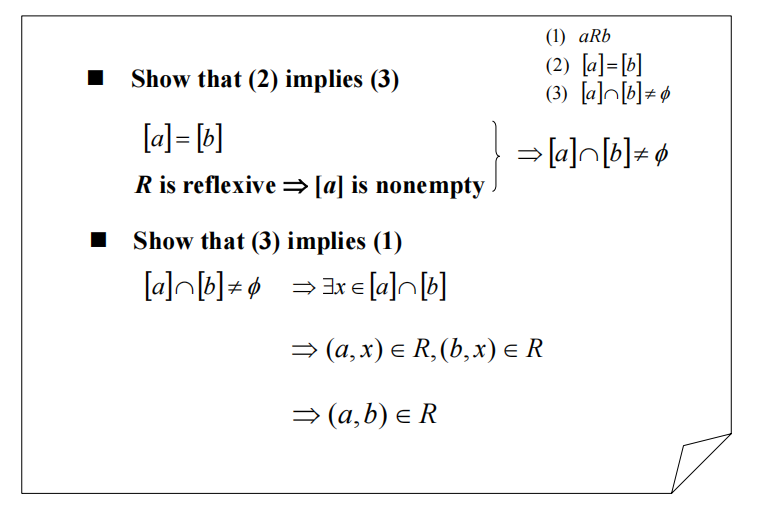


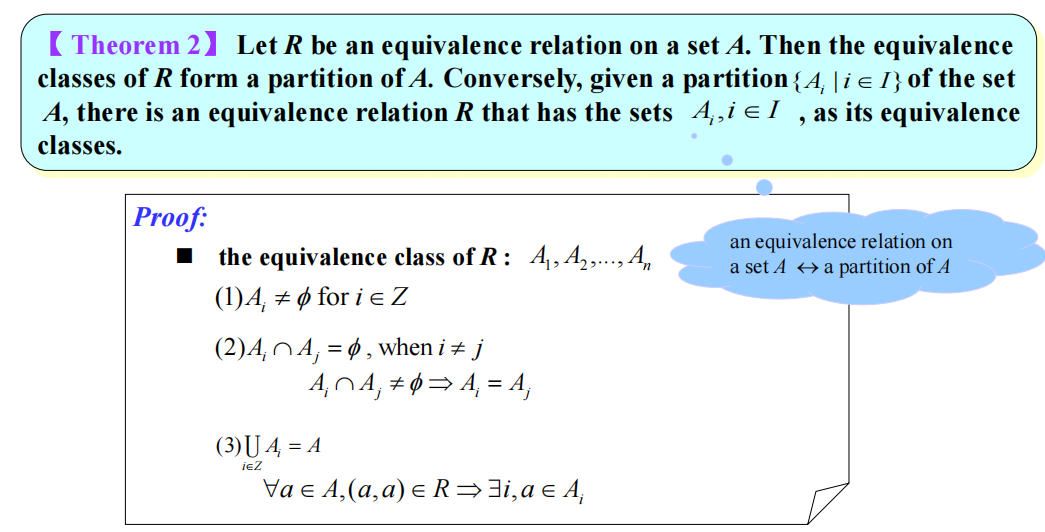


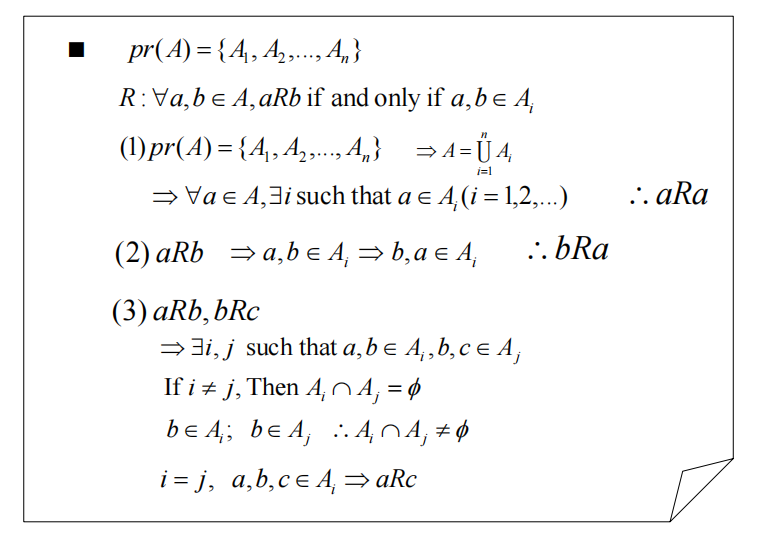


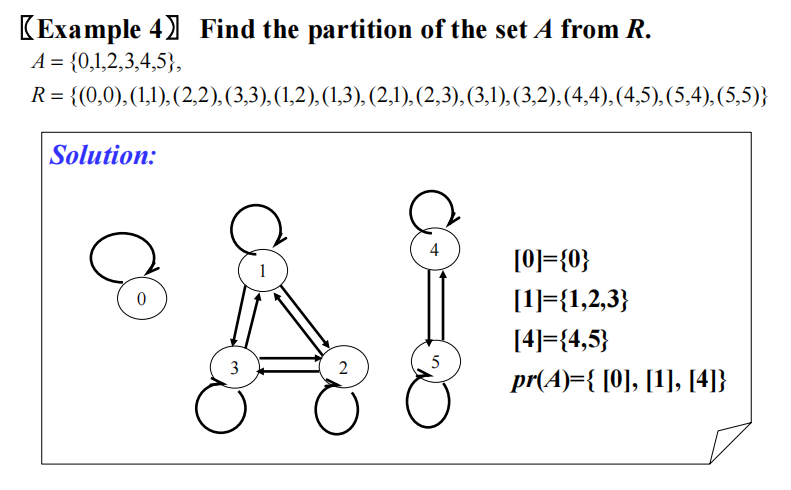


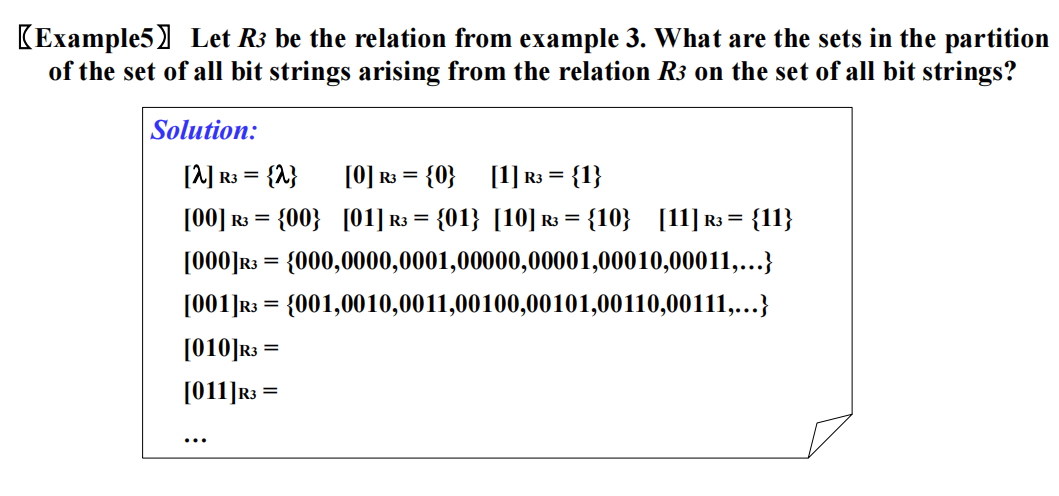


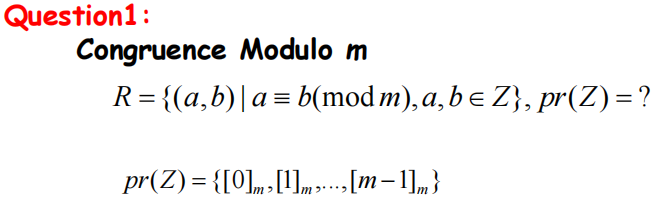


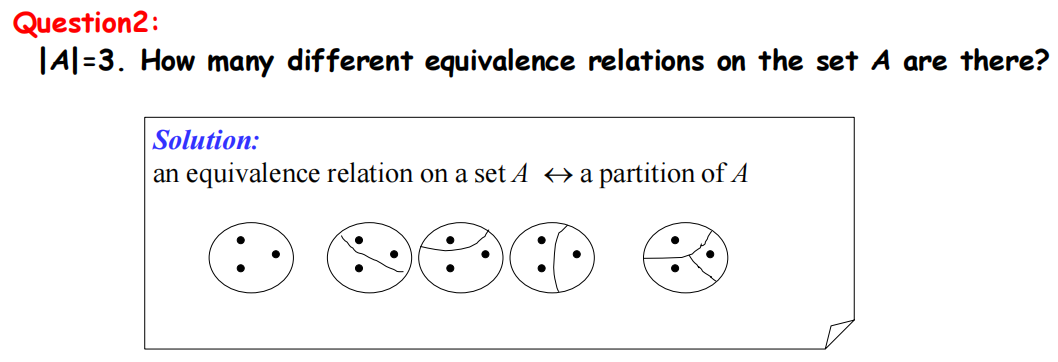


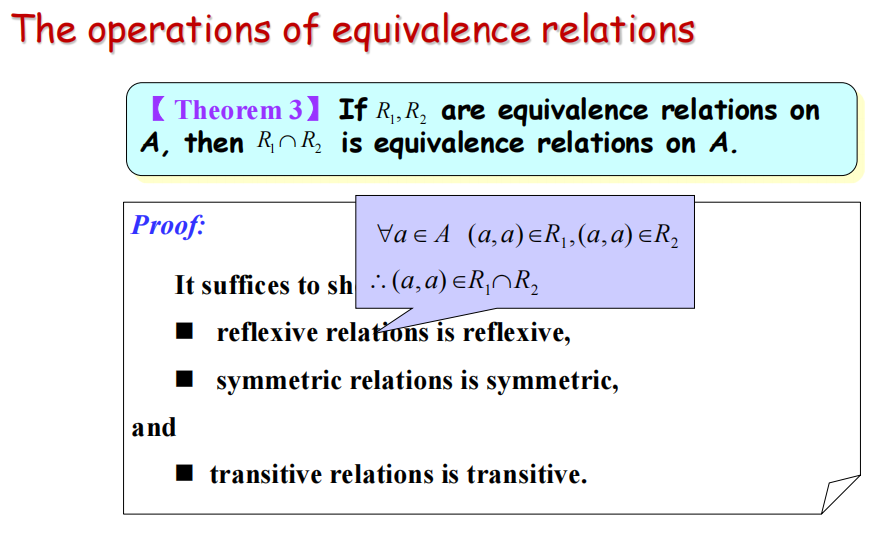


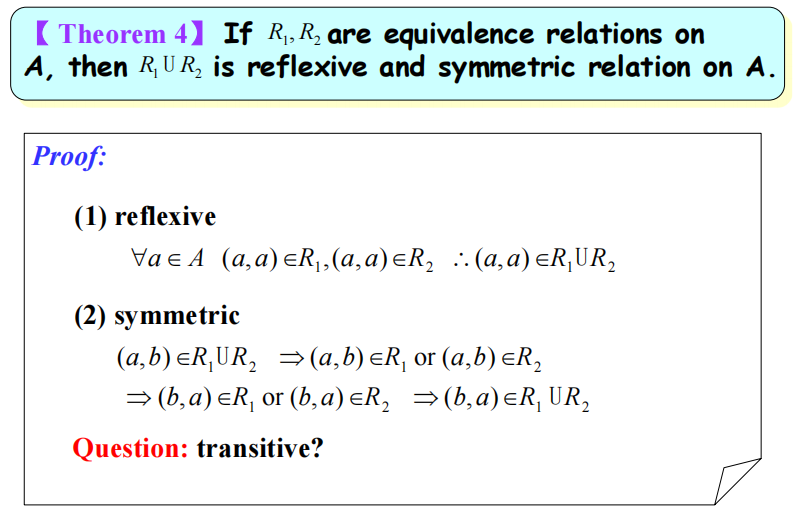


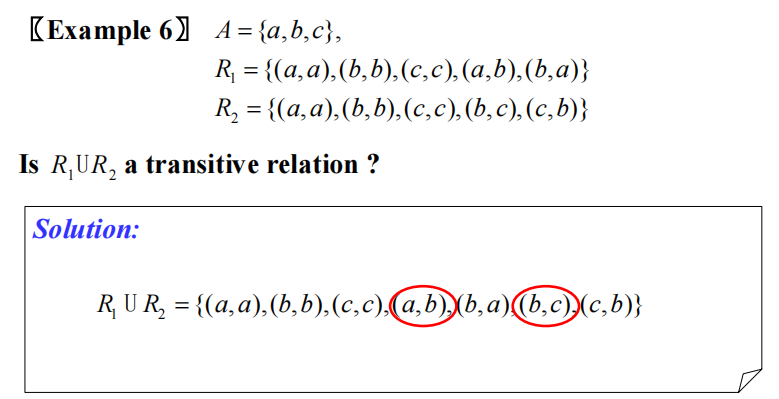


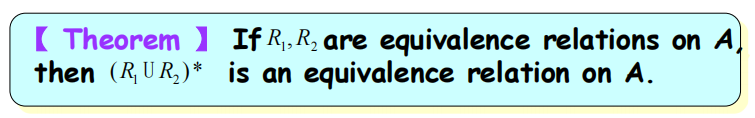




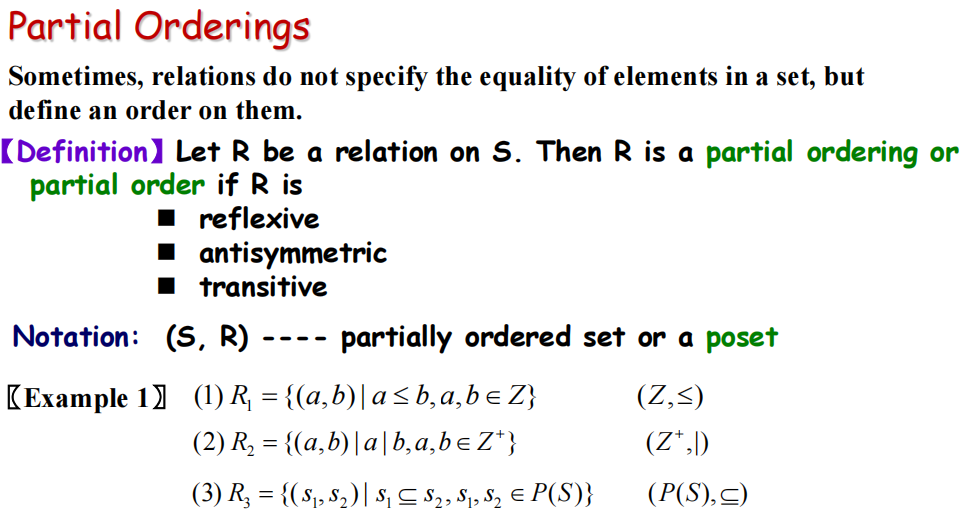






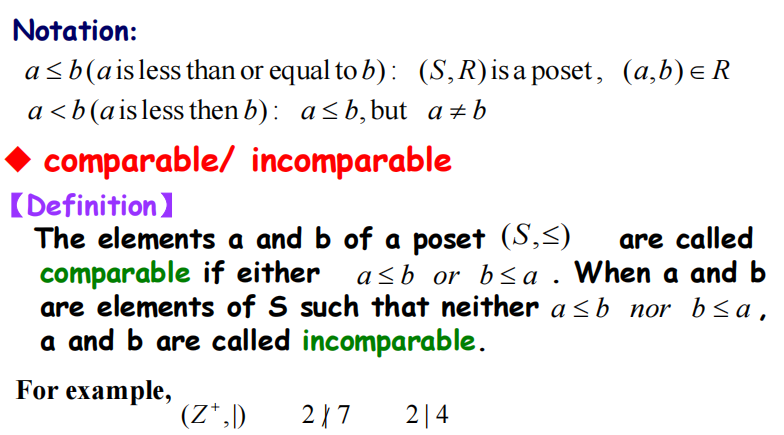


（9.6）**Partial Orderings（偏序/半序）**

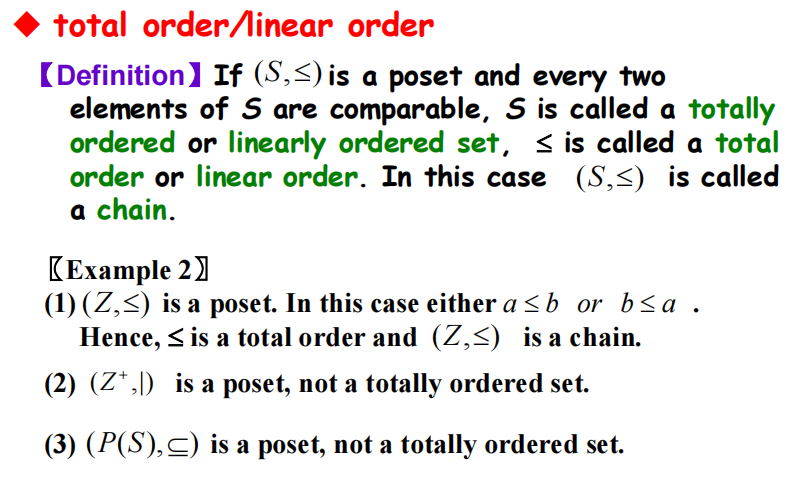


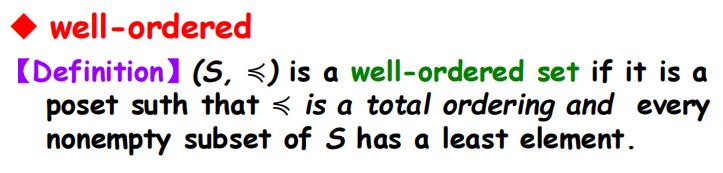
**Poset（偏序集）**

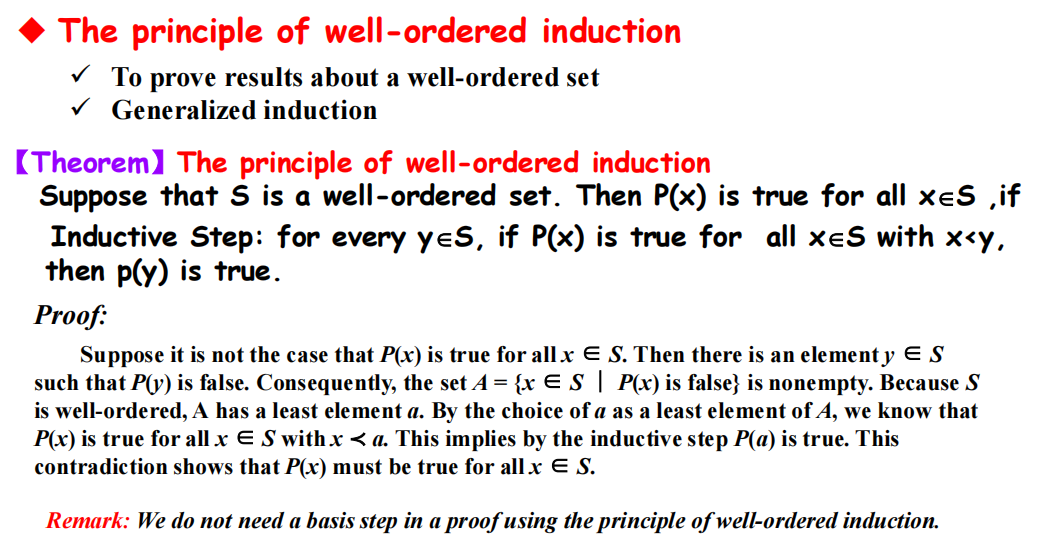
**（这里的≤和＜是打错了，应该是书上的那个符号）！！！**



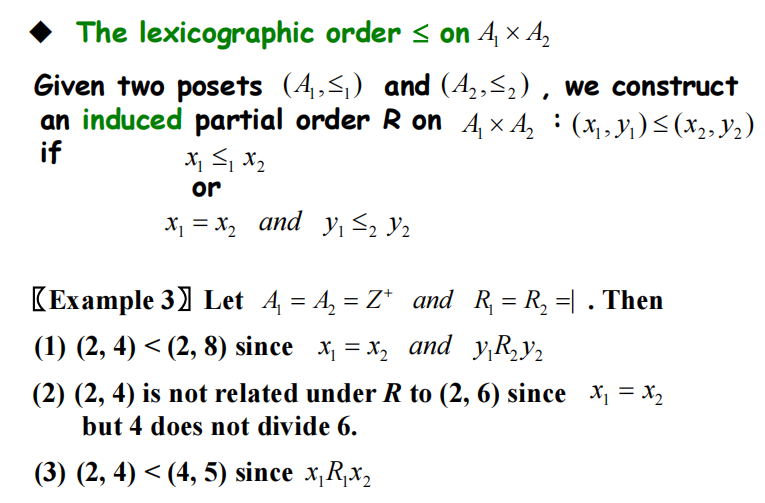
**（这里的≤和＜也是打错了！！！）**

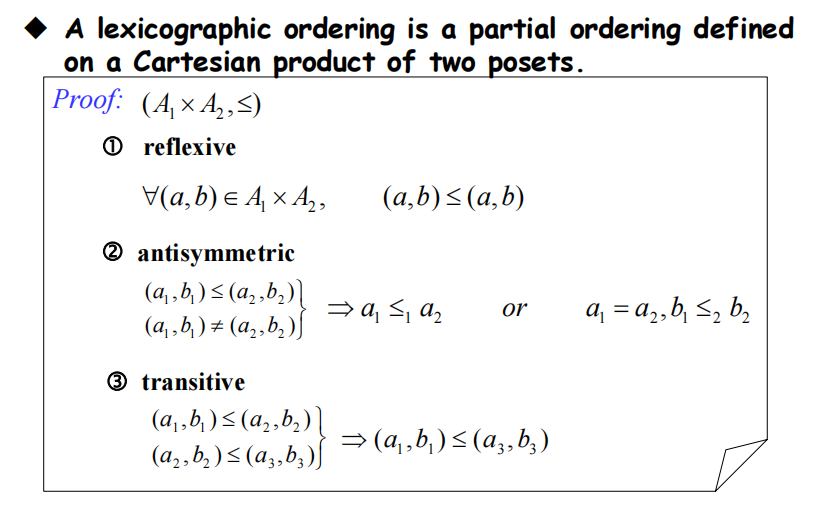


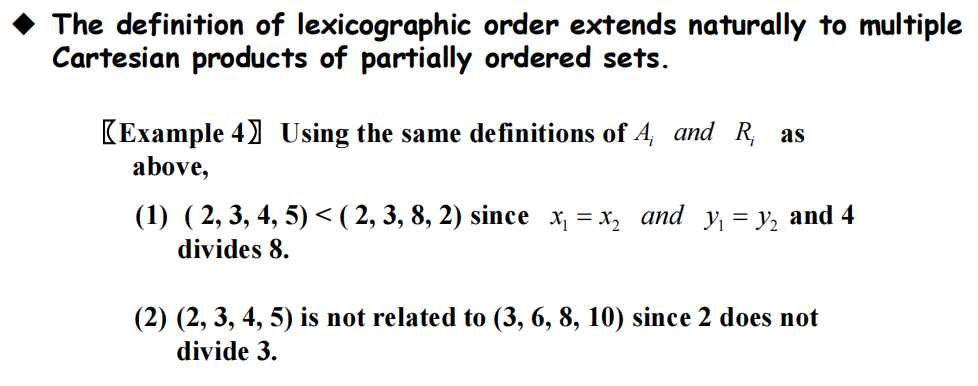


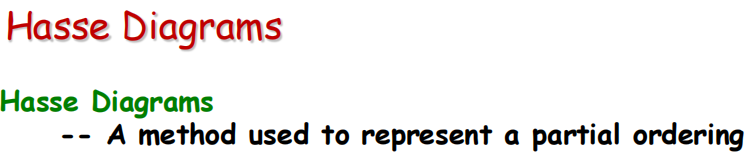


Lexicographic Order（字典序）









**To construct a Hasse diagram:**

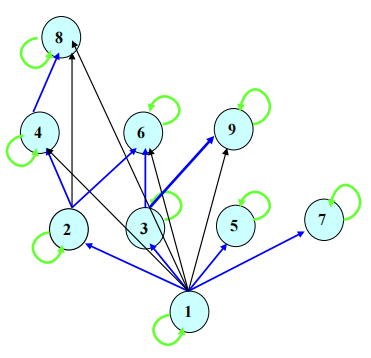
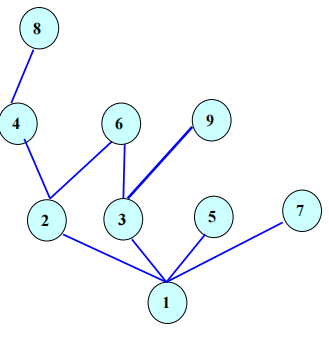
**1) Construct a digraph representation of the poset *(A, R)* so that all arcs point up (except the loops).**

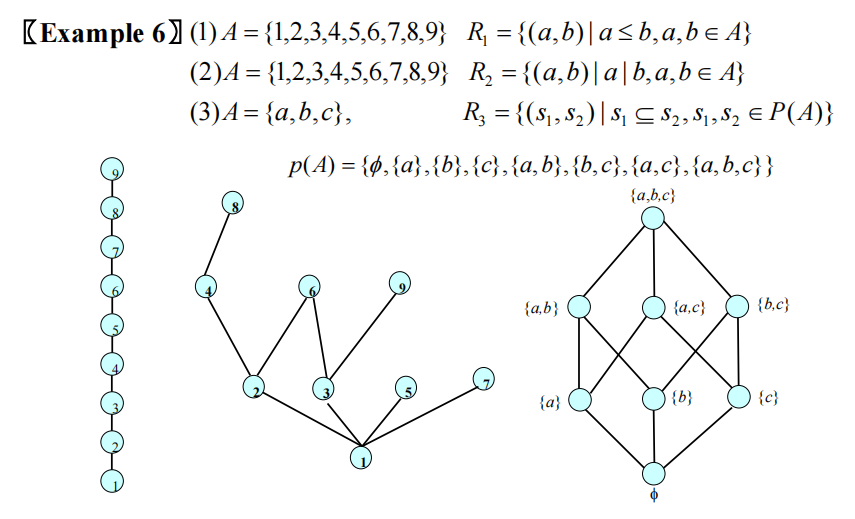
**2) Eliminate all loops**

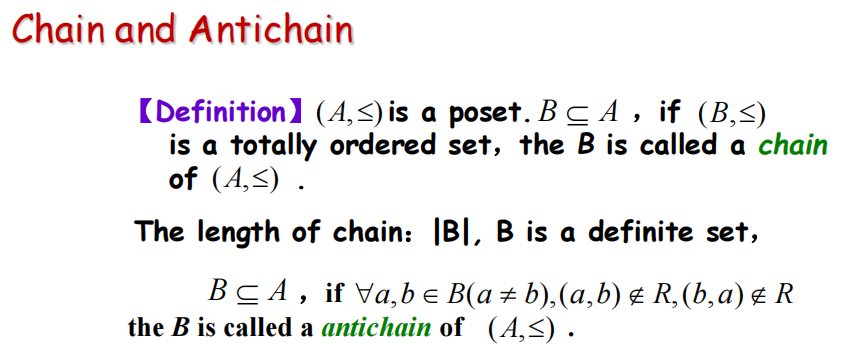
**3) Eliminate all arcs that are redundant because of transitivity**

**4) Eliminate the arrows at the ends of arcs since everything points up.**

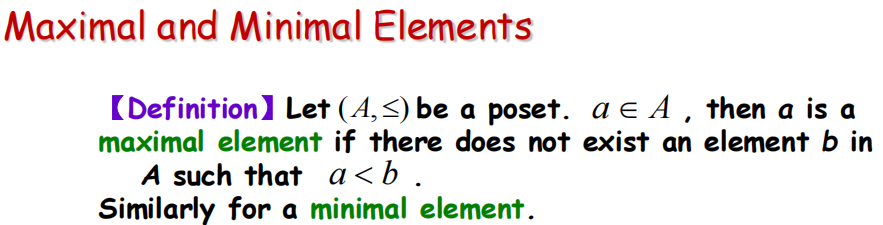


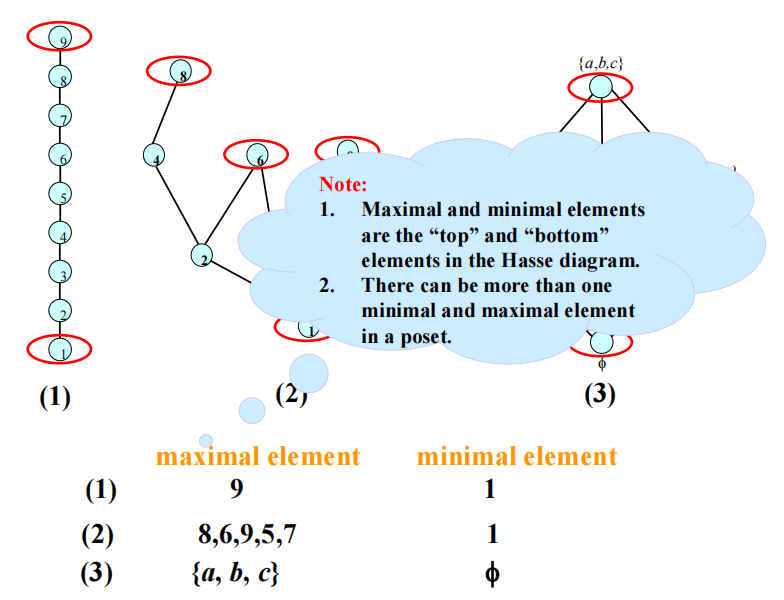
 



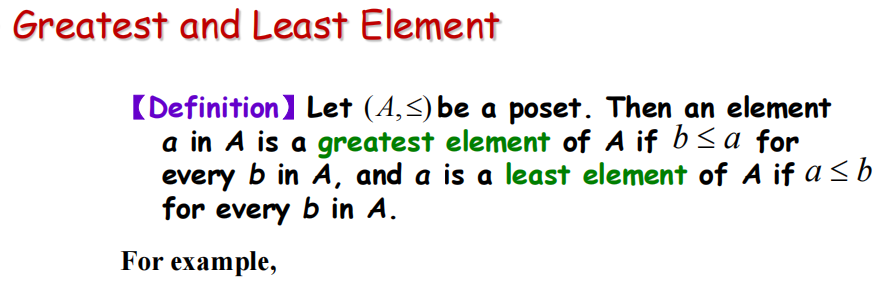


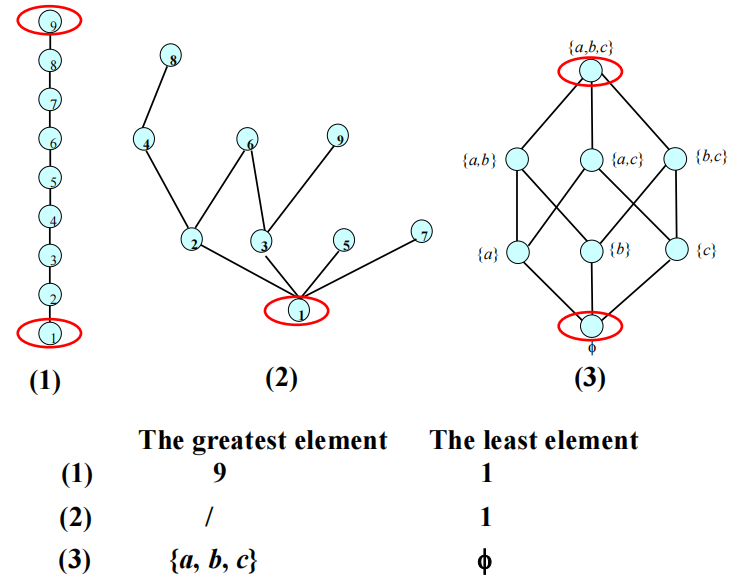
（极大元与极小元）

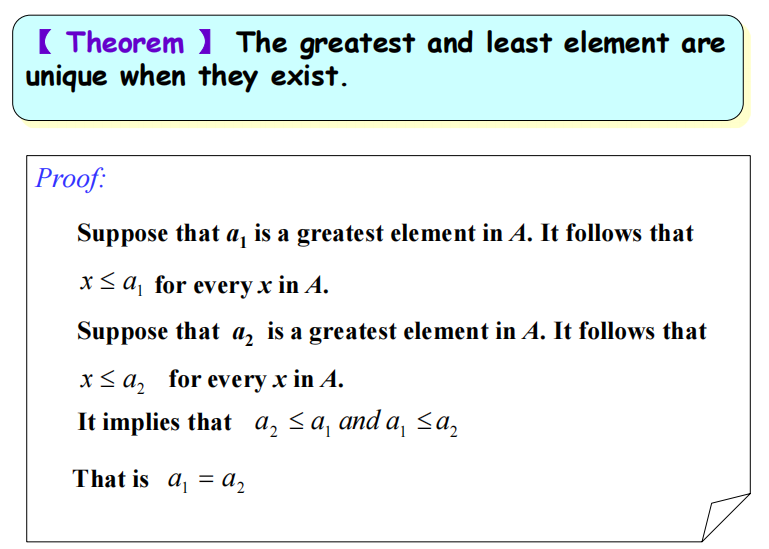


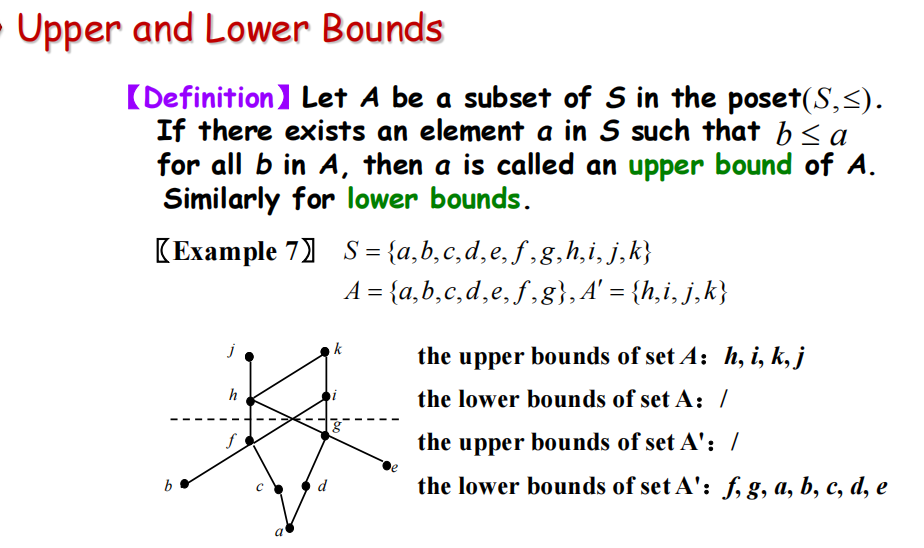


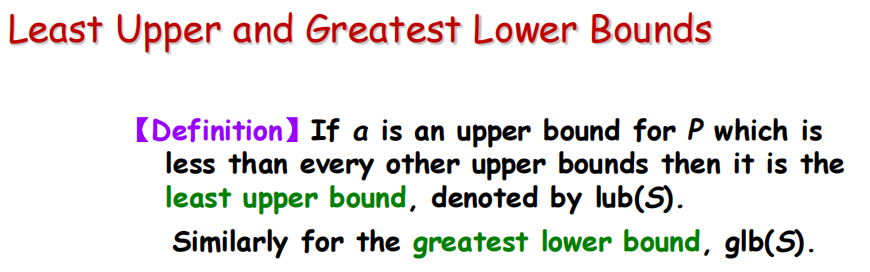
（最大元与最小元）

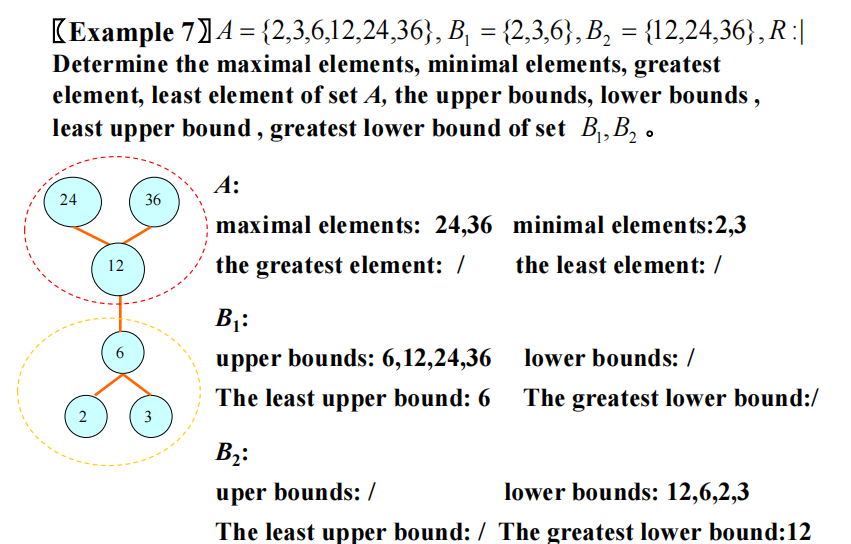












Lattices（格）

