

Section Week 8

Solutions

Review of Relations

List the ordered pairs in the relation R from $A=\{0,1,2,3,4\}$ to $B=\{0,1,2,3\}$ where $(a,b) \in R$ iff:

a) $a \mid b$

Solution: $\{(1,0), (1,1), (1,2), (1,3), (2,0), (2,2), (3,0), (3,3), (4,0)\}$

Review of Relations

List the ordered pairs in the relation R from $A=\{0,1,2,3,4\}$ to $B=\{0,1,2,3\}$ where $(a,b) \in R$ iff:

b) $\gcd(a,b)=1$

Solution: $\{(0,1),(1,0),(1,1),(1,2),(1,3),(2,1),(2,3),$
 $(3,1),(3,2),(4,1),(4,3)\}$

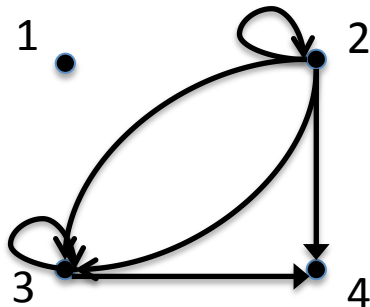
Relational Properties

For each of these relations on the set $\{1,2,3,4\}$, (i) decide whether it is reflexive, symmetric, antisymmetric, and/or transitive. (ii) Draw directed graph of the relation, and (iii) draw the directed graph of each closure specified.

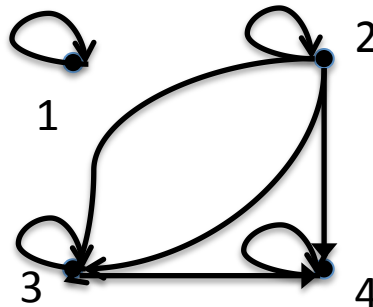
a) $\{(2,2),(2,3),(2,4),(3,2),(3,3),(3,4)\}$

Solution: i) Transitive

ii)



iii) Reflexive Closure:



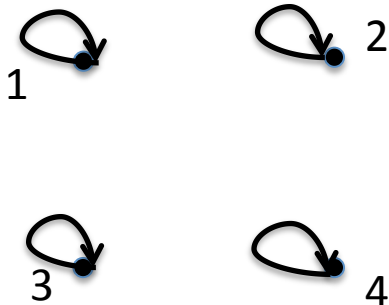
Relational Properties

For each of these relations on the set $\{1,2,3,4\}$, (i) decide whether it is reflexive, symmetric, antisymmetric, and/or transitive. (ii) Draw directed graph of the relation, and (iii) draw the directed graph of each closure specified.

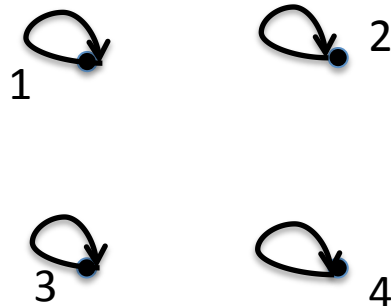
b) $\{(1,1),(2,2),(3,3),(4,4)\}$

Solution: i) Transitive, Reflexive, Symmetric, AND antisymmetric

ii)



iii) Transitive Closure:



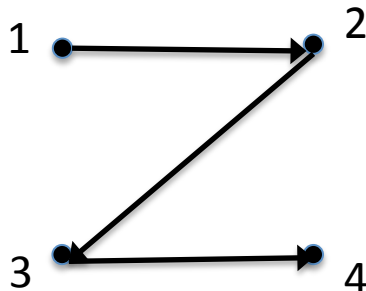
Relational Properties

For each of these relations on the set $\{1,2,3,4\}$, (i) decide whether it is reflexive, symmetric, antisymmetric, and/or transitive. (ii) Draw directed graph of the relation, and (iii) draw the directed graph of each closure specified.

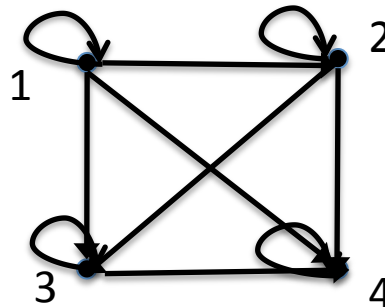
c) $\{(1,2),(2,3),(3,4)\}$

Solution: i) Antisymmetric

ii)



iii) Transitive-Reflexive Closure:



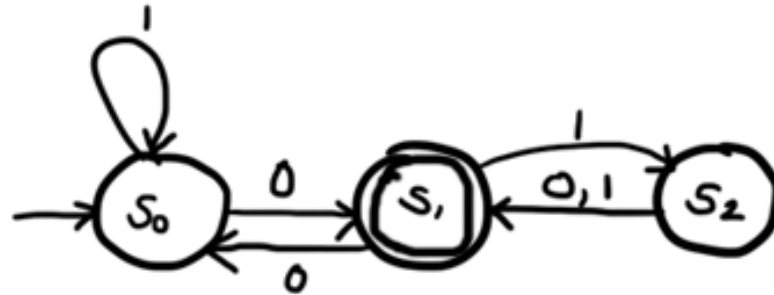
FSMs

3) Draw the state diagrams for the FSMs associated with the following state tables. Which language do these accept if final state is s_1 , t_1 respectively?

a)

	f	
	<i>Input</i>	
	0	1
s_0	s_1	s_0
s_1	s_0	s_2
s_2	s_1	s_1

Solution:



This accepts the language (if s_1 final):
 $(1^*0 \cup 0)(01^*0 \cup 1(0 \cup 1))^*$

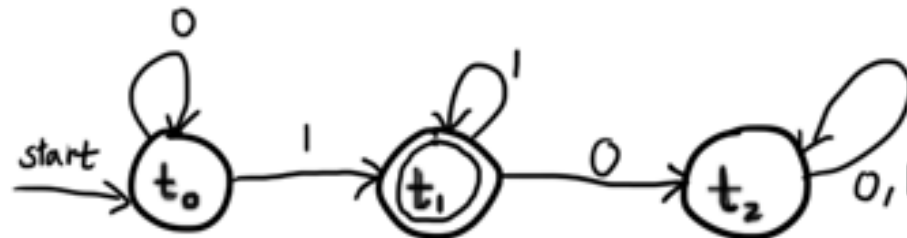
FSMs

3) Draw the state diagrams for the FSMs associated with the following state tables. Which language do these accept if final state is s_1 , t_1 respectively?

a)

	f	
	<i>Input</i>	
	0	1
t_0	t_0	t_1
t_1	t_2	t_1
t_2	t_2	t_2

Solution:



This accepts the language (if t_1 final):
 0^*11^*

FSMs

c) Draw the state diagram associated with the FSM that accepts the intersection of the languages generated by part a) and part b)

