

Name: Key

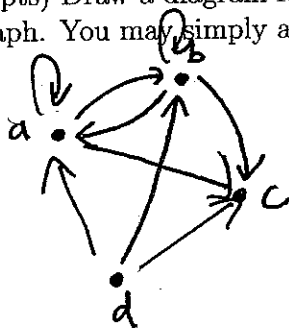
Math 55 Quiz 10

August 7, 2009

GSI: Rob Bayer

You have until 4:00 to complete this quiz. You must show your work.

1. (2 pts) Draw a diagram for the transitive closure of the relation with the following directed graph. You may simply add to this picture if you wish:



2. (4 pts) Let  $A$  be the set of all bit strings of length 4 and let  $\sim$  be the relation on  $A$  given by  $x \sim y \Leftrightarrow x$  and  $y$  have the same number of 1's.

(a) Show that  $\sim$  is an equivalence relation

Sym: If #1's in  $x = \#1's$  in  $y$ , then  $\#1's$  in  $y = \#1's$  in  $x$

Ref: Every string has same # as self

Trans: If  $\#1's$  in  $x = \#1's$  in  $y$  and  $\#1's$  in  $y = \#1's$  in  $z$ , then  $\#1's$  in  $x = \#1's$  in  $z$ .

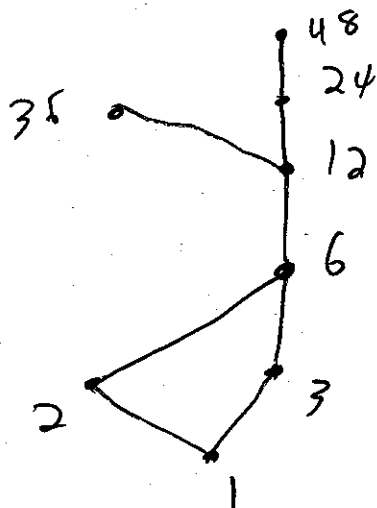
(b) Find all elements of  $[1010]$

$\{1100, 1010, 1001, 0110, 0101, 0011\}$

(over)

3. Consider the divisibility poset given by  $(\{1, 2, 3, 6, 12, 24, 36, 48\}, |)$ .

(a) (2 pts) Draw a Hasse diagram for this poset



(b) (2 pts) What are the maximal elements, the minimal elements, the least elements, and the greatest elements? Note that some of these may not exist.

max: 48, 36

min: 1

least: 1

greatest: none