V2

September 28, 1998

cs330 - Discrete Structures
Fall 1998

Midterm Exam
closed books, closed notes

Starts: **9:00 am** Ends**: 10:15 am**

Name:_____(please print)

ID:_____

Problem	Max points	Your mark	Comments
1	10		10*1
2	5		
3	20		4*5
4	10		5+5
5	10		
6	30		6*5
	85		

1. Let $A = \{\{a\}, \emptyset\}$. Mark with true (T) or false (F) each of the following statements:

Statement	T/F
$a \notin A$	
$a \subseteq A$	
$\emptyset \subseteq A$	
$A \subseteq \emptyset$	
$\{\emptyset\} \in A$	

Statement	T/F
$\{a\} \in A$	
$\{a\} \subseteq A$	
$\{\emptyset\} \subseteq A$	
$\mid A \mid = 2$	
$\{A\} \subseteq \text{power}(A)$	

2. Find $P(P\{\emptyset\}))$, where P denotes the power set of a set.

3. Let S be the set of all three letter strings over the alphabet {a, b}. A relation R on the set S is defined as follows: two elements of S are related iff they begin or end with the same letter. For example **a**bb and **a**ba are related because they both begin with the letter **a**.

a) show the set representation of R

© Virgil Bistriceanu, 1998

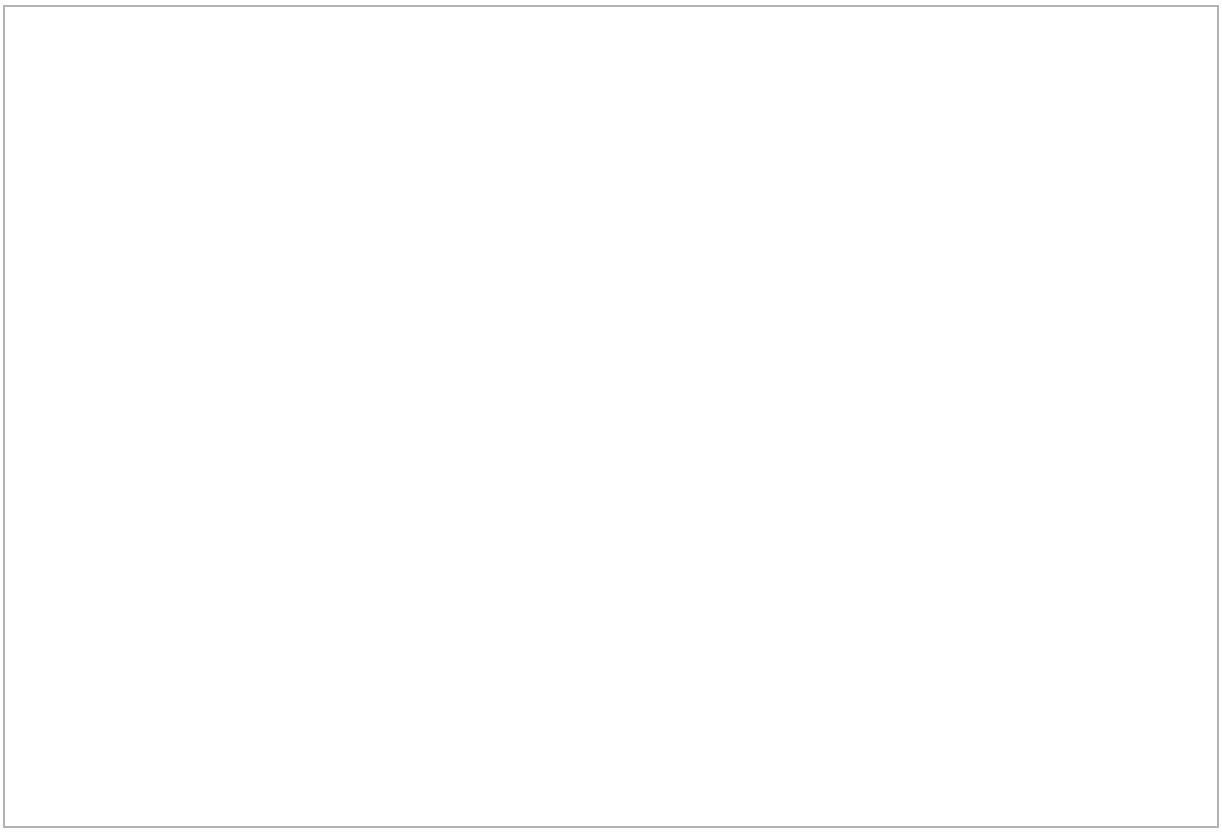
b) show the matrix representation of *R*.

c) Show the digraph of *R*

d) decide whether *R* is an equivalence relation or not. If it is, then show the partition it cre-

© Virgil Bistriceanu, 1998

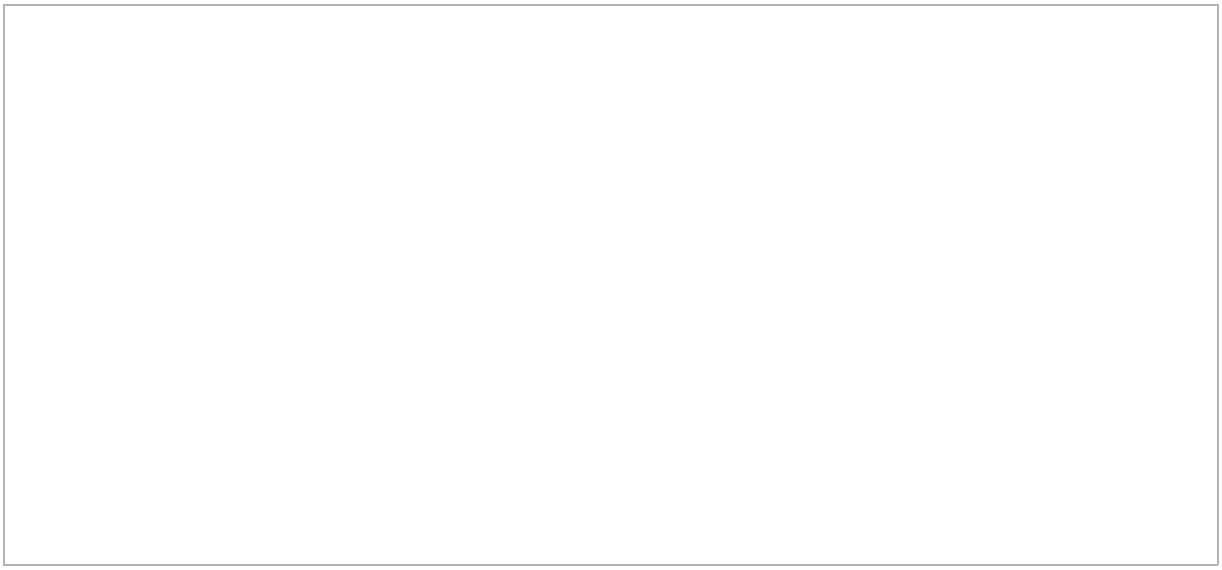
ates on *S*.



4. This is the prefix (Polish) notation for an algebraic expression:

```
*-+ab5+a2
```

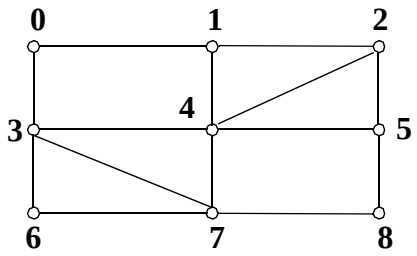
a) Show the tree representation of this expression.



© Virgil Bistriceanu, 1998

b) Show the corresponding algebraic expression

5. Let G be the graph below:



Do a graph traversal for G starting with the least significant digit of your SSN. Use a breadth-first algorithm with lexicographic ordering when choosing a vertex.

6. Give a definition for:

a) Set

© Virgil Bistriceanu, 1998

b) Cartesian product

c) Relation

d) Graph

e) Hamilton Path in a graph

f) Spanning tree

© Virgil Bistriceanu, 1998