March 1, 2000

V1

cs330 - Discrete Structures
Spring 2000

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	15		5*3
3	10		4+3+3
4	10		
5	15		5*3
6	10		2*5
	70		

Computer Science

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

Statement	T/F
$a ? A$	
$a ? A$	
$? ?? ?A$	
$A?? ??$	
$\{?\} ? A$	
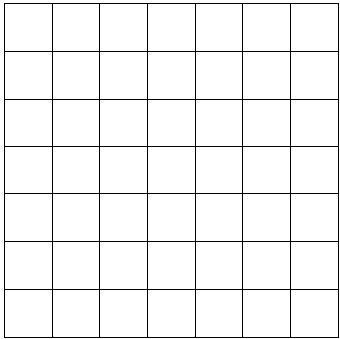
Statement	T/F
$\{a\} ? A$	
$\{b\} ? A$	
$?? ??? A$	
$? ? A$	
$\{a, b\} ? \text{ power}(A)$	

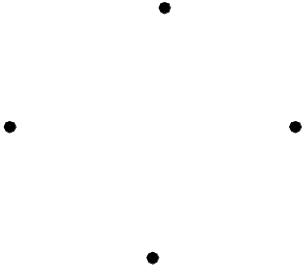**2.** Let $S = \{1, 2, 3, 4\}$ and a relation R on S defined as

$a R b$ if and only if $(a+b) <= 2b$, $a, b ? S$

a) show the set representation of R

b) show the matrix representation of R. c) Show the digraph of R

The matrix of R.   The digraph of R

d) mark with true (T) or false (F) the following statements. If your answer is true then give an example

Statement	Your answer (T/F)	Example
There is a cycle in the digraph		
There is a path of length 3 in the digraph of R		
There is a sink in the digraph		
There is a source in the digraph		
The digraph is connected		

e) Decide whether the relation R on S is an equivalence relation or not. If it is then show the partition it creates on S.

3. This is the postfix (reverse Polish) notation for an algebraic expression:
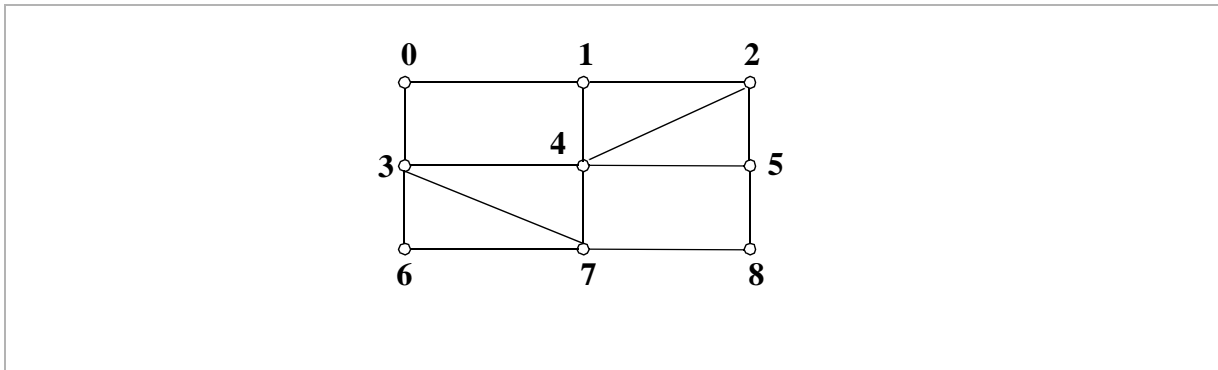
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ab+cd*ef/--a*
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a) Show the tree representation of this expression.

b) Show the corresponding algebraic expression

c) Show the prefix notation for the expression.

4.   Let G be the graph below:

Construct a spanning tree for this graph starting with the vertex given by the right-most digit of your Social Security Number (if that digit is 9, then the start vertex will be 0). Use a depth first algorithm with lexicographic ordering when choosing a vertex.

5.   Give a definition for:

a) set

b) relation

c) Cartesian product

d) tree

e) spanning tree

6. Explain the difference between:

a) an Euler cycle and a Hamiltonian cycle in a connected, undirected graph

b) a set and a list