V1

October 2, 2000

cs330 - Discrete Structures
Fall 2000

Midterm Exam
closed books, closed notes

Starts:**8:35 am**   Ends**: 9:50 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	5		
5	12		4*3
6	8		2*4
	60		

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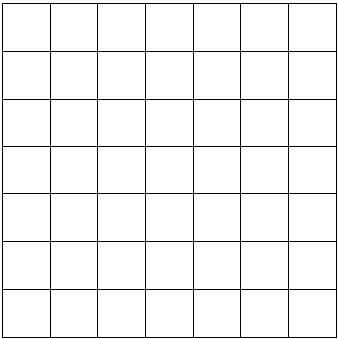
Statement	T/F
$\{a\}$? A	
$\{b\}$? A	
?? ??? A	
? ? A	
$\{a, b\}$? power(A)	

2.   Let $S = \{1, 2, 3, 4\}$ and a relation R on S defined as
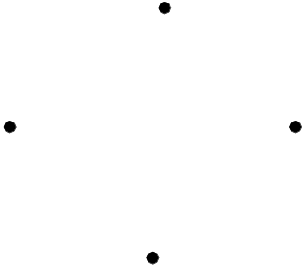
   $a\ R\ b$ if and only if $(a+b) <= 2b$, a, b ? S

   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		

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:
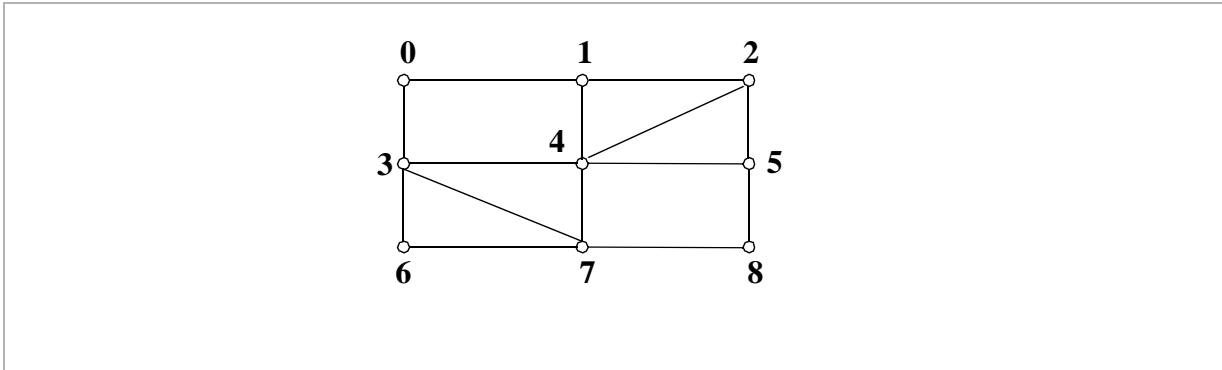
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ab+cd*ef/--a*
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a) Show the tree representation of this expression.

b) Show the corresponding algebraic expression

c) Show the prefix notation for the expression.

4. Let G be the graph below:

Do a graph traversal 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

6.   Explain the difference between:

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

b) a set and a list