

V1

February 28, 2001

cs330 - Discrete Structures
Spring 2001

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 $A = \{\{a, b\}, \emptyset\}$. 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
$\{a\} \in A$	
$\{b\} \subseteq A$	
$\{\emptyset\} \subseteq A$	
$\emptyset \in A$	
$\{a, b\} \subseteq \text{power}(A)$	

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

$$a R b \text{ if and only if } (a+b) \leq 2b, a, b \in S$$

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:

$$ab+cd*ef/--a*$$

a) Show the tree representation of this expression.

b) Show the corresponding algebraic expression

c) Cartesian product

d) tree

6. Explain the difference between:

a) a tree and a graph

b) a set and a list