October 18, 1995

cs330 - Discrete Structures
Fall 1995

Midterm Exam
open books, open notes

Starts: **2:10 pm**
Ends**:** **3:00 pm**

Name:_____(please print)
ID:_____

1	18 points	__	(2 points for each)
2	12 points	__	(3 points each)
3	6 points	__	(3 points each)
4	6 points	__	
5	9 points	__	(3 points each)
6	5 points	__	
	Total	__ / 55	

Please return this page with your exam.

1. Let $A = \{a, \varnothing\}$. Answer true or false for each of the following statements:

a) $a \in A$

b) $\{a\} \in A$

c) $a \subseteq A$

d) $\{a\} \subseteq A$

e) $\varnothing \subseteq A$

f) $\varnothing \in A$

g $\{\varnothing\} \subseteq A$

h) $\{\varnothing\} \in A$

i) $\{\varnothing\} \in power(A)$

2. For each integer i, define A_i as follows:

if i is even then $A_i = \{ x \mid x \in Z$ and $x < -i$ or $i < x \}$

if i is odd then $A_i = \{ x \mid x \in Z$ and $-i < x < i \}$

Describe each of the sets:

a) A_0

b) A_2

c) A_{-3}

d) Find the union of the sets A_i, $i \in \{1, 2, 3\}$

3. Formalize each of the following English sentences. The domain of discourse is the set of all people. In every case indicate what is the propositional function you use.

a) Every commitee member is rich and famous.

b) No college graduate is dumb.

4. Decide if the following argumentation is valid or not: "A necessary condition to pass this class is to pass the midterm. I fail this class. Therefore I don't pass the midterm".

5. Let S = {a, b}, and the function f defined as follows:

$f: strings(S) \rightarrow N$

$f(s_{n-1}...s_2 s_1 s_0) = n$ (the length of the string $s_{n-1}..s_2 s_1 s_0$, $s_i \in S$)

strings(S) is the set of all strings over the set S. Indicate whether the following statements are true or false. Indicate why:

a) *f* is not a function because one may not use such a set for the domain.

b) the function *f* is injective

c) the function *f* is surjective

6. Convert $(3fe)_{16}$ to base 12.