Homework 01

Due: Friday, January 20, 2006

Instructions

1. Please review the homework grading policy outlined in the course information page.

2. On the *first page* of your solution write-up, you *must* make explicit which problems are to be graded for regular credit, which problems are to be graded for extra credit, and which problems you did not attempt. Use a table that looks like this:

Problem	1	2	3	4	5	6	7	8	9	...
Credit	RC	RC	RC	EC	RC	EC	NA	NA	EC	...

where "RC" denotes "regular credit", "EC" denotes "extra credit", and "NA" denotes "not attempted". Failure to include such a table will result in an arbitrary set of problems being graded for regular credit, no problems being graded for extra credit, and a 5% penalty assessment.

3. You must also write down with whom you worked on the assignment. If this varies from problem to problem, write down this information separately with each problem.

Problems

Required: 4 of the following 5 problems
Points: 25 points per problem

1. a. Give the formal description of the FA shown in Figure 1.69(a) (p. 76).

    b. Give the state transition diagram for the FA whose formal description is $(\{1,2,3,4\}, \{\mathtt{a}, \mathtt{b}, \mathtt{c}\}, \delta, 1, \{2,3\})$, where δ is given by the following table:

	a	b	c
1	1	2	2
2	3	4	1
3	1	1	1
4	2	3	4

2. Do Exercise 1.6(a,b,c,d,e).

3. Do Exercise 1.6(f,g,h,i).

4. Do Exercise 1.6(j,k,l,m,n).

5. a. Do Exercise 1.27, and describe what each state in your diagram represents.

    b. Construct a finite state transducer (FST) whose input alphabet is $\{0,1\}$ and whose output alphabet is $\{\mathtt{s}, \mathtt{d}\}$ and which works as follows: If the current input symbol is the same as the previous input symbol, the output should be $\mathtt{s}$ (which stands for *same*); if they are different the output should be $\mathtt{d}$ (which stands for *different*). Adopt the convention that the first output symbol is always $\mathtt{d}$. For example, if the input string is 00101110 the output of your FST should be $\mathtt{dsdddssd}$. Describe what each state in your FST represents.