CE 160 Problem Sets
First Semester, 2005-2006

Exercise and page numbers are from the textbook unless indicated otherwise.
Study Chapter 1 as needed.

Problem Set 2.1.
(Study sections 2.1 and 2.2 on Deterministic Finite Automata)

1. Exercise 2.2.3, p. 54
2. Exercise 2.2.4 (b), p. 54
3. Exercise 2.2.4 (c), p. 54
4. Exercise 2.2.5 (a), p. 54
5. Exercise 2.2.5 (c), p. 54

Problem Set 2.2.
(Study sections 2.1 and 2.2 on Deterministic Finite Automata)

1. Exercise 2.2.5 (d), p. 54
2. Exercise 2.2.6 (b), p. 54
3. Exercise 2.2.7, p. 54
4. Exercise 2.2.8 (a), p. 54
5. Exercise 2.2.11, p. 55

Problem Set 2.3.
(Study section 2.3 on Nondeterministic Finite Automata)

1. Exercise 2.3.2, p. 66
2. Exercise 2.3.3, p. 67
3. Exercise 2.3.4 (b), p. 67
4. Exercise 2.3.4 (c), p. 67
5. Design an NFA who language is the set of all strings over {0,1} such that the 3rd symbol from the end is a 1. Convert this NFA to a DFA.

Problem Set 2.4.
Use the Graphical DFA Editor to do:

1. Exercise 2.2.4 (b), p. 54
2. Exercise 2.2.5 (a), p. 54
3. Exercise 2.2.5 (c), p. 54
4. Exercise 2.2.5 (d), p. 54
5. Exercise 2.2.6 (b), p. 54

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Problem Set 2.5.
(Study section 2.5 on Finite Automata with Epsilon Transitions)

1. Exercise 5.1.4 (a), p. 180
2. Exercise 2.5.2, p. 80
3. Exercise 2.5.3 (a), p. 80
4. Exercise 2.5.3 (b), p. 80
5. Exercise 2.5.3 (c), p. 80

Problem Set 2.6.
(Study section 3.1 on Regular Expressions)

1. Exercise 3.1.1 (b), p. 89
2. Exercise 3.1.1 (c), p. 89
3. Exercise 3.1.2 (b), p. 89
4. Exercise 3.1.3 (a), p. 90
5. Exercise 3.1.4 (c), p. 90

Problem Set 2.7.
(Study section 3.2 on Finite Automata and Regular Expressions)

1. Exercise 3.2.1 (c), p. 106
2. Exercise 3.2.3, p. 106
3. Exercise 3.2.4 (c), p. 106-107
4. Write a UNIX-style regular expression for floating point constants in C/C++

Problem Set 2.8.
(Study sections 5.1 and 5.2 on Context-Free Grammars and Parse Trees)

1. Exercise 5.1.1 (c), p. 179-180
2. Exercise 5.1.2, p. 180
3. Design a CFG for the set of all strings of balanced parentheses (a string of parentheses is "balanced" if each left parenthesis has a matching right parenthesis, and pairs of matching parentheses are properly nested).
4. Exercise 5.1.4 (b), p. 180
5. Design a CFG for the set of all palindromes over {0,1,2} that have odd length.

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Problem Set 2.9.
(Study sections 6.1 and 6.2 on Pushdown Automata)

1. Exercise 6.1.1 (b), p. 228
2. Exercise 6.1.1 (c), p. 228
3. Design a PDA whose final state language is the set of all strings over {0,1} such that no prefix has more 1's than 0's.
4. Design a PDA whose empty stack language is the set of all strings over {0,1} such that no prefix has more 1's than 0's.
5. Design a PDA whose empty stack language is the set of all strings over {0,1} with an equal number of 0's and 1's.

Problem Set 2.10.

None

Problem Set 2.11.
Use the project on "Tabular Representation of Finite Automata" to do:

1. Exercise 2.2.4 (b), p. 54
2. Exercise 2.2.5 (a), p. 54
3. Exercise 2.2.5 (c), p. 54
4. Exercise 2.2.5 (d), p. 54
5. Exercise 2.2.6 (b), p. 54

Problem Set 2.12.

Do the following exercises using the NFA to DFA Converter:

1. Exercise 2.3.1, p. 66
2. Exercise 2.3.2, p. 66
3. Exercise 2.3.3, p. 67