Math 385 Exam 1 review

You should be able to give formal definitions for the following, and, given a particular example, explain how it matches up with the formal definition.

- Deterministic and nondeterministic finite automata
- Acceptance of a word by a DFA or NFA
- Regular expression
- Language defined by a regular expression
- Grammar
- Right regular grammar
- Word generated by a grammar

You should be able to do the following

- Construct a DFA or NFA accepting a specified language (up to a reasonable level of complexity)
- Given an NFA, construct an equivalent DFA
- Given a regular expression, list words in the language it defines
- Given a regular expression, construct an NFA that accepts it
- Given a DFA or NFA, find a regular expression for the language it accepts
- Given a DFA or NFA, construct a right regular grammar generating the language it accepts
- Given a right regular grammar, construct an NFA accepting the language it generates
- Construct a grammar generating a specified language
- Given a way to modify a language, prove that the modification applied to a regular language results in a regular language (by giving a way to correspondingly modify automata or regular expressions or grammars)
- Given a decision problem involving a regular language, find an algorithm that solves the decision problem.

Relevant problems in the book with solutions in the back:

- 1.2: 11d, 12, 13, 14ad
- 2.1: 2c, 5a, 7ad, 9ad, 13, 23
- 2.2: 3, 8, 18, 21
- 2.3: 2, 7, 8, 11
- 3.1: 2, 6ac, 10, 13, 16c, 17c, 18a, 20c, 23
- 3.2: 3, 4a, 10b
- 3.3: 4, 11, 13a
- 4.1: 2a, 7, 14, 18
- 4.2: 1, 2, 5, 12