Your name: _____

Submit this paper copy with your written answers at the beginning of class on Wednesday, November 20. Remember that there is also an electronic turnin for the code portion of this homework that is due Tuesday November 19, before midnight.

1. For each of the following regular expressions, (i) give an English description of the set of strings generated (for example, "all strings consisting of 1 or more w's followed by xyz"), and (ii) give an example of a five-character string that can be generated by the expression.

a. (0|101)*

b. b(ob)+

c. 0[0-7]*

d. (right|wr(ong|ite))

2. Give regular expressions that will generate the following strings.

a. All strings of lowercase letters in the range *a-f* where the letters are in ascending lexicographic order.

b. All strings of *a*'s and *b*'s that either start with *a* and have an even length or start with *b* and have an odd length.

3. Here is a description from the Java Language Specification (§3.10.1, Integer Literals) for hexadecimal (base 16) integer literals. Write a set of regular expressions that generate hexadecimal literals as described here.

HexIntegerLiteral:
      HexNumeral IntegerTypeSuffix$_{opt}$

IntegerTypeSuffix: one of
      l L

An integer literal is of type `long` if it is suffixed with an ASCII letter **L** or **l** (ell); otherwise it is of type int (§4.2.1). The suffix **L** is preferred, because the letter **l** (ell) is often hard to distinguish from the digit **1** (one).

A hexadecimal numeral consists of the leading ASCII characters `0x` or `0X` followed by one or more ASCII hexadecimal digits and can represent a positive, zero, or negative integer. Hexadecimal digits with values 10 through 15 are represented by the ASCII letters a through f or A through F, respectively; each letter used as a hexadecimal digit may be uppercase or lowercase.

HexNumeral:
      0 x *HexDigits*
      0 X *HexDigits*

HexDigits:
      HexDigit
      HexDigit HexDigits

The following production from §3.3 is repeated here for clarity:

HexDigit: one of
      0 1 2 3 4 5 6 7 8 9 a b c d e f A B C D E F

4. Draw a diagram of a deterministic finite automaton (DFA) that recognizes hexadecimal integer literals as defined by your answer to the preceding question. You can draw this directly; you don't need to use an algorithm for converting a set of regular expressions to an NFA and then a DFA.