Computer Science 411
Homework 11: Final Homework
Fall 2013
Due 12/4/2013

1. For the language L = all strings over $\{a, b\}$ that contain the substring aa, but not the substring bab

   (a) (4 points) Give either a DFA or NFA for L

   (b) (4 points) Give a regular expression for L. You can either do the mechanical conversion, or just create a regular expression youself from scratch.

2. (8 points) Show that the language L = all strings over $\{a, b, +, *, (,)\}$ that represent valid regular expressions over the alphabet $\{a, b\}$ is Context-Free, but not regular

3. Show that both of the following decision problems are in **P**:

   (a) (4 points) DNF-Satisfiability: Given a Boolean expression in *disjunctive* normal form (the disjunction of clauses, each of which is a conjunction of literals) is satisfiable.

   DNF Example: The formula $f = (x_1 \wedge x_2) \vee (x_3 \wedge \overline{x_4} \wedge x_5) \vee (\overline{x_2} \wedge x_3)$ is in disjunctive normal form.

   (b) (4 points) CNF-Tautology: Given a boolean expression in Conjunctive Normal Form, is it a tautology (that is, is it true under any truth assignment of its variables)?