CMSC 22610 Winter 2005	Implementation of Computer Languages	Homework 3 Due February 10

1. Translate the following regular expressions into a context free grammar:

   (a) $(a \cdot b^* \cdot a) \mid (b \cdot a^* \cdot b)$

   (b) $(0 \mid 1)^+(.(0 \mid 1)^+)^?$ (here "." is a terminal symbol).

2. Consider the following grammar:

$$\begin{array}{rcl} E & \rightarrow & U \\ & \rightarrow & U \texttt{+} E \\ & \rightarrow & U \texttt{-} E \\ U & \rightarrow & A \\ & \rightarrow & \texttt{-} U \\ A & \rightarrow & \texttt{(} E \texttt{)} \\ & \rightarrow & \mathbf{num} \end{array}$$

   (a) What is the associativity of **+** and **-** in this grammar?

   (b) Draw the *derivation tree* for **1-2+-3**.

3. Give an LL(1) grammer for this language that preserves the associativity and precedence of the operators.