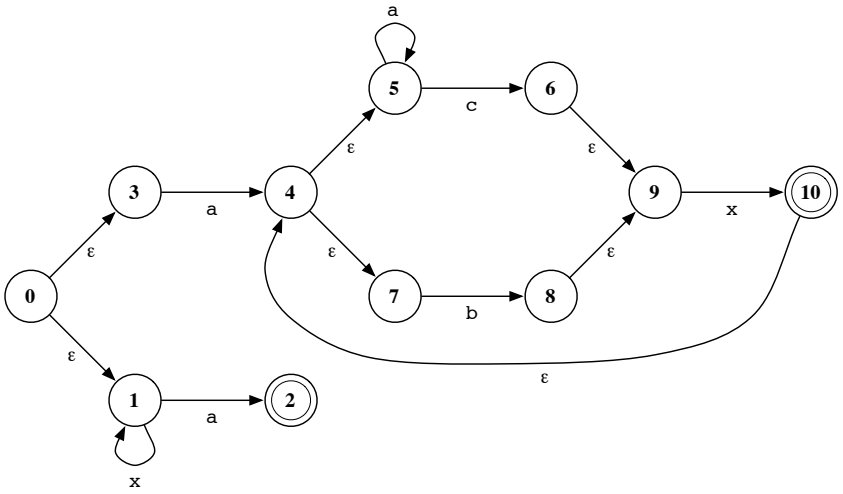
CMSC 22600 **Autumn 2016**	**Compilers for Computer Languages**	**Homework 2** **Due Tuesday, Nov 1**

This homework assignment is a written assignment about scanning and parsing. Please turn in your completed homework at the **beginning** of class on Tuesday, November 1.

1. Write regular expressions for the following languages:
   (a) Strings over the alphabet $\{a, b, c\}$ with an odd number of as.
   (b) Strings over the alphabet $\{a, b, c\}$ where the first a precedes any occurrence of b.
   (c) Strings over the alphabet $\{0, 1\}$ that represent powers of two in binary.
2. (a)-(c) Draw the finite state machines (NFAs) for the languages in 1(a)-(c).
3. Convert the following NFA to a DFA using the subset-construction method.



4. Give an RE that generates the same language as the NFA in Problem 3.
5. Translate the following regular expression into a context free grammar:

$$(\mathbf{b} \mid \mathbf{c})^* \cdot \mathbf{a} \cdot ((\mathbf{b} \mid \mathbf{c})^* \cdot \mathbf{a} \cdot (\mathbf{b} \mid \mathbf{c})^* \cdot \mathbf{a})^* \cdot (\mathbf{b} \mid \mathbf{c})^*$$

6. Consider the following grammar:

$$
\begin{array}{rcl}
E & \to & T \\
 & \to & T\texttt{+}E \\
 & \to & T\texttt{-}E \\
T & \to & A \\
 & \to & \texttt{-}T \\
A & \to & \texttt{[}E\texttt{]} \\
 & \to & \textbf{id}
\end{array}
$$

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

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

History

2016-10-24 First version.